HATCHERY AND GENETIC MANAGEMENT PLAN (HGMP)

Hatchery Program:	Kalama River Winter-Late Steelhead (Integrated)
Species or Hatchery Stock:	Winter Steelhead (*Oncorhynchus mykiss*) Endemic Kalama River Stock
Agency/Operator:	Washington Department of Fish and Wildlife
Watershed and Region:	Kalama River/Lower Columbia
Date Submitted:	
Date Last Updated:	August 19, 2014

Executive Summary

The Washington Department of Fish and Wildlife is submitting a Hatchery and Genetic Management Plan (HGMP) for the Kalama River endemic winter-late steelhead program to the National Marine Fisheries (NMFS) for consultation under Section 10(a)(1)(A) or 4(d) of the Endangered Species Act (ESA). NMFS will use the information in this HGMP to evaluate the hatchery impacts on salmon and steelhead listed under the ESA. The primary goal of an HGMP is to devise biologically-based hatchery management strategies that ensure the conservation and recovery of salmon and steelhead populations. This HGMP focuses on the implementation of hatchery reform actions adopted by the Washington Fish and Wildlife Commission Policy on Hatchery and Fishery Reform C-3619.

The purpose of the program is to produce Kalama River endemic winter-late steelhead for sustainable escapement to the watershed, while providing recreational fisheries under mark-selective fishery regulations. Program fish will be produced at the Kalama Falls Hatchery, located on the Kalama River (WRIA 27.0002), Fallert Creek Hatchery, located on Hatchery/Fallert Creek (WRIA 27.0017, tributary to the Kalama River), Mossyrock Hatchery, located on the Cowlitz River (WRIA 26.0002), and Gobar Acclimation Pond, located on Gobar Creek (WRIA 27.0003), tributary to the Little Kalama River. The program will annually release 45,000 yearlings to the Kalama River.

This winter-late steelhead HGMP is built around the principles and recommendations of the Hatchery Scientific Review Group (HSRG). These principles and recommendations represent the best science available for operating hatchery facilities consistent with the conservation of salmonid species. The program has been operated as a “integrated type” program, as defined by the HSRG, since 1998. An “integrated” program is one in which natural-origin individuals are used in the hatchery broodstocks. Integration is achieved by using returning adult natural-origin summer steelhead (distinguished by an intact adipose fin) returning to the Kalama River at the Kalama Falls hatchery trap (RKm 36.8) from late-February through early-May. All fish released through this hatchery program have been 100% mass-marked (adipose fin-clipped) since the project began in 1998.

The Lower Columbia River steelhead are listed as “Threatened” under the ESA. The DPS includes the Kalama River Wild Winter-run and Summer-run programs.

Broodstock Collection:
The broodstock is derived from natural-origin stock returning to the Kalama sub-basin. The current egg-take goal is 90,000 at Kalama Falls Hatchery; up to 75 adult pairs (30% of the run) may be collected. Surplus F1 hatchery-origin fish may be recycled downstream, or transported to Kress Lake, a small land-locked lake in the lower Kalama basin, for additional sport harvest opportunity; no hatchery-origin winter-late steelhead are passed into the upper watershed. In high return years, fish may be donated to local food banks.

Harvest:
Total annual harvest is dependent on management response to annual abundance in *Pacific Salmon Commission* (PSC - U.S./Canada), *Pacific Fishery Management Council* (PFMC - U.S. ocean), and *Columbia River Compact* forums. WDFW has also received authorization for tributary, Columbia River mainstem, and ocean fisheries; the combined harvest rates in the *Fisheries Management and Evaluation Plan* (FMEP), *Columbia River Fish Management Plan* (CRFMP), and ocean fisheries are reviewed annually in the North of Falcon process to ensure the harvest rates are consistent with recovery of the Lower Columbia River Tule Chinook population. The *U.S. v Oregon* Technical Advisory Committee (TAC) has prepared Biological Assessments (BAs) for combined fisheries based on relevant *U.S. v Oregon* management plans and agreements. The current BA concerns Columbia River treaty Indian and non-Indian fisheries, as described in the “2008–2017 *U.S. v Oregon* Management Agreement for upriver Chinook, sockeye, steelhead, coho, and white sturgeon” (2008–2017 MA).

Under permanent regulations, the mainstem Columbia River is open to the retention of hatchery steelhead beginning May 16 from the Tongue Point/Rocky Point line upstream to the I-5 Bridge and June 16 from the I-5 Bridge upstream to the Oregon/Washington border above McNary Dam. The steelhead fishery is closed under permanent regulations during April 1–May 15 between Tongue Point and the I-5 Bridge and April 1–June 15 upstream of I-5, when spring Chinook abundance is high.

Due to a lack of coded-wire tag studies and limitations that not all fish can be accounted for as being harvested or as back-to-rack counts, smolt-to-adult survival rates (SAR) are likely underestimated. Based on the average SAR of 2.87% for brood years 2001-2009, and a programmed on-station release goal of 45,000 yearlings, the estimated production goal would be 1,292 adults.

Monitoring and Evaluation:
Performance indicators for harvest will be accomplished by continuing mass-marking (adipose fin-clip); CWT recoveries help determine stray rate contributions on spawning grounds by watersheds close in proximity to this program's release vicinity. WDFW also plans to implement a genetic monitoring program to measure introgressive hybridization between segregated hatchery steelhead and wild populations.

Operation and Maintenance of Hatchery Facilities:
WDFW's Kalama endemic summer steelhead program uses four facilities. The facility furthest upstream in the Kalama River basin is Gobar Pond, which draws water from an intake on Gobar Creek at a rate of 7 cubic feet per second (cfs). Kalama Falls Hatchery has water rights to divert water at a rate of 270 cfs from the Kalama River and 5 cfs from two non-fish bearing unnamed creeks. Fallert Creek Hatchery has water rights to divert water at a rate of 8.7 cfs from the Kalama River and 25 cfs from Fallert Creek. Mossyrock Trout Hatchery is supplied by spring water at a rate of 800-2,000 gpm depending on rainfall, weather, and agricultural use of the aquifer. Mossyrock Hatchery is used for incubation for this program due to its pathogen-free water source.

Gobar Pond is designed for overflow for downstream fish passage, debris transport, and upstream fish passage. Kalama Falls Hatchery is a 100% barrier to fish passage, with a diversion dam forcing fish to enter a step and pool ladder leading to a concrete trapping area. Fallert Creek Hatchery prevents passage upstream into Fallert Creek; rebuild of a new intake system is expected to be completed by 2015. The return water systems at Kalama Falls, Fallert Creek and Mossyrock hatcheries operate under National Pollutant Discharge Elimination System (NPDES) permits. Gobar Pond is exempt because the total pounds of production at the site is less than 20,000 pounds.

1 SECTION 1. GENERAL PROGRAM DESCRIPTION

1.1 Name of hatchery or program.

Kalama River Winter-Late Endemic Steelhead

1.2 Species and population (or stock) under propagation, and ESA status.

Kalama Winter-late Steelhead (*Oncorhynchus mykiss*)

ESA Status: "Threatened" March 19, 1998 (63FR13347); reaffirmed on August 15, 2011 (76 FR 50448).

1.3 Responsible organization and individuals

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Other agencies, Tribes, co-operators, or organizations involved, including contractors, and extent of involvement in the program:

NOAA-National Marine Fisheries Service (NMFS) – Manager of Mitchell Act Funds

1.4 Funding source, staffing level, and annual hatchery program operational costs.

Funding Sources	Operation Information
Mitchell Act	Full time equivalent staff – 7.5
	Annual operating cost (dollars) - $1.13-million

The above information for full-time equivalent staff and annual operating cost applies cumulatively to anadromous program facilities and cannot be broken out specifically by program.

1.5 Location(s) of hatchery and associated facilities.

Broodstock Source: Kalama River Winter-Late Endemic Steelhead

Table 1.5.1: Location of culturing phases, by facility.

Facility	Culturing Phase	Location
Kalama Falls Hatchery	Broodstock collection, Adult holding/spawning. Incubation (eyeing) , Rearing, Acclimation	Kalama River (WRIA 27.0002) at RM 36.8 (RKm 59.2); tributary to the Columbia River at RM 73.1 (RKm 117.6), Lower Columbia River, Washington.
Fallert Creek Hatchery	Incubation, Rearing, Acclimation	Hatchery/Fallert Creek (WRIA 27.0017) at RKm 0.5; tributary to the Kalama River at RKm 7.9 (RM 4.9); Lower Columbia River, Washington.

Mossyrock Hatchery	Incubation	Mayfield Lake on the Cowlitz River (WRIA 26.0002) at ~RKm. 96.6; tributary to the Columbia River at RKm 109.4; Lower Columbia River, Washington.
Gobar Rearing Pond	Rearing, Acclimation	Gobar Creek (WRIA 27.0073) at 4.8 RKm; tributary to the Little Kalama River (WRIA 27.0046) at RM 19.5 (RKm 32.2); tributary to the Kalama River (WRIA 27.0002) at RM 13.6 (RKm 21.9); tributary to the Columbia River at RM 73.1 (RKm 117.6), Lower Columbia River, Washington

Note: Fallert Creek Hatchery is also known as "Kalama No. 2."

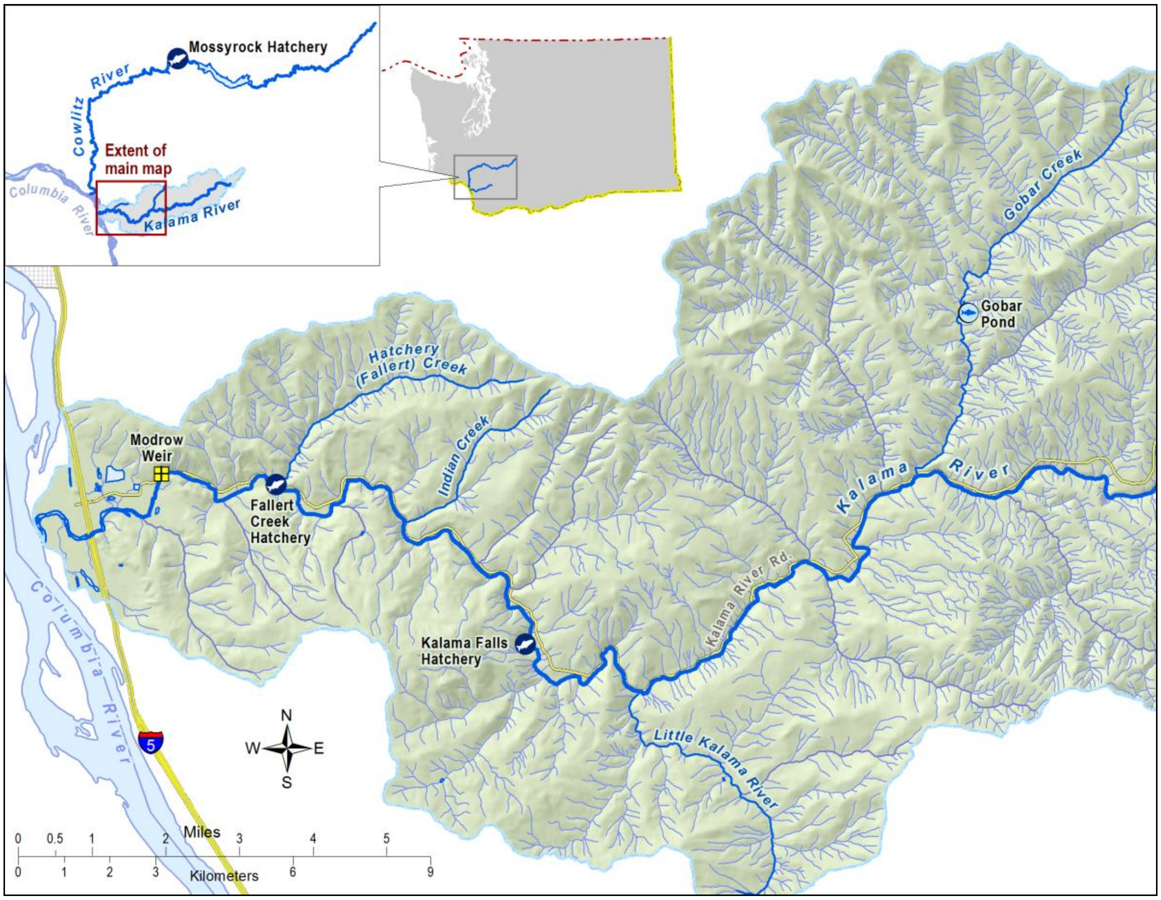

Figure 1.1: Map of facilities used for Kalama Winter-Late Steelhead program; including Fallert Creek, Kalama Falls and Mossyrock hatcheries, and Gobar Acclimation Pond. Source: WDFW GIS 2014.

1.6 Type of program.

Integrated Harvest

1.7 Purpose (Goal) of program.

Mitigation/Augmentation. The goal of this program is to provide escapement to the watershed and meet sport harvest goals under the mark-selective fishery regulations (retention of adipose-clipped fish only), while minimizing impacts to natural-origin listed salmonids and steelhead. Also serves as mitigation for development (including hydro-power) and habitat degradation.

1.8 Justification for the program.

The program is funded through the Mitchell Act via NOAA-NMFS for the purpose of mitigation for lost fish production due to development within the Columbia River Basin.

WDFW protects listed fish and provides harvest opportunity on hatchery fish through the Lower Columbia River- *Fish Management and Evaluation Plan* (FMEP) (WDFW 2001). All mainstem and tributary fisheries are managed as mark-selective (no wild retention) fisheries to minimize the impact on listed wild fish.

To minimize impact on listed fish by the Kalama Winter-Late Endemic Steelhead program and operations, the following risk aversions are included in this HGMP (**Table 1.8.1**).

Table 1.8.1: Summary of risk aversion measures.

Potential Hazard	HGMP Reference	Risk Aversion Measures
Water Withdrawal	4.1	Water rights are formalized through trust water right from the WA Department of Ecology (see **Table 4.1.1**). Monitoring and measurement of water usage is reported in monthly NPDES reports.
Intake Screening	4.1	*Kalama Falls Hatchery.* The new intake structure is compliant. *Fallert Creek Hatchery.* Intake screens at Fallert Creek are in compliance with state and federal guidelines (NMFS 1995, 1996), but do not meet the current *Anadromous Salmonid Passage Facility Design* criteria (NMFS 2011). A feasibility report for the river intake was funded in 2011 completed in 2012. WDFW is in the process of designing a new river intake system to meet NOAA-NMFS compliance (Mitchell Act Intake and Fish Passage Study Report 2003), and has included it in the 2013-2015 Capital Budget Request. *Mossyrock Hatchery*. The hatchery water supply is from springs on site, no fish bearing water. *Gobar Ponds*. It is unknown whether or not the intake is in compliance (see section 4.2).
Effluent Discharge	4.1	These facilities operate under the "U*pland Fin-Fish Hatching and Rearing*" *National Pollution Discharge Elimination System* (NPDES) administered by the Washington Department of Ecology (DOE).
Broodstock Collection & Adult Passage	7.9	Adults are collected at Kalama Falls Hatchery trap; the Modrow Trap (RKm 4.8) is not installed during winter steelhead broodstock collection. See HGMP section 7.2 All fish are mass-marked (adipose fin-clipped) prior to release. Broodstock collection and sorting procedures can quickly identify listed non-target listed fish, and if encountered, released per protocol to minimize impact as determined by WDFW Region 5 staff.
Disease Transmission	7.9, 10.11	The *Salmonid Disease Control Policy of the Fisheries Co-Managers of Washington State* (WDFW and WWTIT 1998, updated 2006) and the *Fish Health Policy in the Columbia Basin* details hatchery practices and operations designed to stop the introduction and/or spread of any diseases within the Columbia Basin. Also, *Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries* (Fish Health Policy Chapter 5, IHOT 1995).
Competition & Predation	2.2.3, 10.11	Fish are released at a time, size and the system and life history stage to foster rapid migration to marine waters, and to allow juvenile listed fish to grow to a size that reduces potential for predation.

		Current risk aversions and future considerations are being reviewed and evaluated for further minimizing impacts to listed fish.

1.9 List of program "Performance Standards".

See HGMP section 1.10. Standards and indicators are referenced from Northwest Power Planning Council (NPPC) Artificial Production Review (APR) (NPPC 2001).

1.10 List of program "Performance Indicators", designated by "benefits" and "risks."

1.10.1 "Performance Indicators" addressing benefits.

Table 1.10.1: "Performance Indicators" addressing benefits.

Benefits		
Performance Standard	**Performance Indicator**	**Monitoring & Evaluation**
3.1.2 Program contributes to mitigation requirements. Program provides mitigation for lost fish production due to development within the Columbia River Basin.	Number of fish released by program returning, or caught, as applicable to given mitigation requirements.	Annually estimate survival and contribution for each brood year released. This program provides mitigation for lost fish production due to development within the Columbia River Basin and contributes to a meaningful harvest in sport and commercial fisheries.
3.1.3 Program addresses ESA responsibilities.	Program complies with Federal ESA-listed fish take authorizations for harvest and hatchery actions.	Hatchery program operation addresses ESA requirements through the development and review of this HGMP. HGMP updated and re-submitted to NOAA with significant changes or under permit agreement. Compliance with ESA is managed with sport fishery regulations that minimize impacts to ESA-listed fish and are monitored by WDFW law enforcement officers. The FMEP outlines anticipated encounter rates and expected mortality rates for these fisheries. Creel surveys are being implemented to verify. Natural populations are monitored annually to assess trends and compare with goals. HGMP updated and re-submitted to NOAA with significant changes or under permit agreement.
3.2.1: Fish produced for harvest are propagated and released in a manner enabling effective harvest, as described in all applicable fisheries management	Annual number of fish produced by this program caught in all fisheries, including estimates of fish released and associated incidental mortalities, by	Annually mass-mark hatchery releases to differentiate hatchery from natural-origin fish and record estimates of mark rate. The external mark enables mark-

plans, while adequately minimizing by-catch of non-target species.	fisheries.	selective fisheries, which can reduce directed harvest mortality on natural-origin fish. Harvest is regulated to meet appropriate biological assessment criteria. Agencies monitor harvests to provide up-to-date information. Estimate survival and contribution to fisheries for each brood year released.
3.3.1. Artificial propagation program contributes to an increasing number of spawners returning to natural spawning areas.	Annual number of naturally-produced adults or redds on the spawning grounds or selected natural production index areas.	Annually monitor and report returns to the hatchery and spawning grounds.
3.3.2 Releases are sufficiently marked to allow statistically significant evaluation of program contribution to natural production, and to evaluate effects of the program on the local natural population.	Percentage of total hatchery releases are identifiable as hatchery-origin fish. Mass-mark (fin-clip, tags, otolith-mark, other, etc., depending on species) production fish to identify them from naturally produced fish.	Annually monitor and report size, number, mass-mark quality (mark rate/tag rate) and date of all hatchery releases by mark type. Annually sample returning fish for the mass-mark in fisheries and at the hatchery; monitor and report numbers of estimated hatchery (marked) and natural (unmarked) fish.
3.4.1 Fish collected for broodstock are taken throughout the return or spawning period in proportions approximating the timing and age distribution of population from which broodstock is taken.	Temporal distribution of broodstock collection at point of collection.	Collect broodstock representatively and systematically throughout the return. Collect annual run timing, age and sex composition and spawning escapement timing data. Adhere to WDFW spawning guidelines (Seidel 1983; HSRG 2009).
3.5.5 Juveniles are released at fully-smolted stage to benefit juvenile to adult survival rates, and reduce the likelihood for residualism and negative ecological interactions with natural-origin fish.	Level of smoltification (size, appearance, behavior, etc.) at release compared to WDFW rearing and release guidelines. Release type (forced, volitional, or direct).	Monitor fish condition in the facilities throughout all rearing stages. Annually monitor and record size, number, and date of release.
3.6.1 The hatchery program uses standard scientific procedures to evaluate various aspects of artificial propagation.	Apply basic monitoring standards in the hatchery: food conversion rates, growth trajectories, mark/tag rate error, weight distribution (CV).	Collect annual run timing, age and sex composition data upon adult return. Annually record growth rates, mark rate and size at release and release dates. See also HGMP section 11 for program monitoring and

		evaluation.
3.8.3 Non-monetary societal benefits for which the program is designed are achieved.	Program is designed to help achieve the end goal of conserving and stabilizing natural salmon populations.	Long-term monitoring of system population will indicate success of program.

1.10.2 <u>“Performance Indicators” addressing risks.</u>

Table 1.10.2: “Performance indicators” addressing risks.

Risks		
Performance Standard	**Performance Indicator**	**Monitoring & Evaluation**
3.1.3 Program addresses ESA responsibilities	Program complies with Federal ESA-listed fish take authorizations for harvest and hatchery actions.	HGMP is updated to reflect any major changes in program and resubmitted to NOAA fisheries. Program risks have been addressed in this HGMP through best available science hatchery management actions. WDFW staff annually reviews Future Brood Document (FBD) for stock, size, number, date and location of releases from all production programs. Monitor and record juvenile hatchery fish size, number, date of release and mass-mark quality; monitor contribution of hatchery adult fish to fisheries and escapement.
3.2.1 Fish produced for harvest are produced and released in a manner enabling effective harvest, as described in all applicable fisheries management plans, while adequately minimizing by-catch of non-target species.	Number of marks released and estimated proportion of marks in out-migrant juveniles and returning adults on the spawning ground. Production fish are mass-marked (adipose fin-clip) to allow for their differentiation from naturally-produced fish	Monitor and record juvenile hatchery fish size, number, date of release and mass-mark (fin clips, tags, etc.) quality; monitor contribution of hatchery adult fish to fisheries and escapement. Harvest is regulated to meet appropriate biological assessment criteria. Agencies monitor harvests and hatchery escapements to provide up-to-date information.
3.2.2 Release groups are sufficiently marked in a manner consistent with information needs and protocols to enable determination of impacts to natural- and hatchery-origin fish in fisheries.	Percentage of total hatchery releases are identifiable as hatchery-origin fish. Mass-mark (adipose-fin clip, tags, otolith-mark, etc., depending on species) produced fish to allow for their differentiation from naturally produced fish for selective fisheries.	Annually monitor and report size, number, date of release and mass-mark quality (adipose fin-clip rate) of all hatchery releases. Annually assess harvest of mass-marked hatchery fish based on CRC estimates and creel surveys.
3.3.2 Releases are sufficiently marked to allow statistically significant evaluation of program contribution to natural	All hatchery production is identifiable in some manner (fin-marks, tags, otolith, etc.) consistent with information	Annually monitor and record size, number, date of release and mass-mark quality (tag rate) of

production and to evaluate effects of the program on the local natural population.	needs.	hatchery releases. Examine returning fish encountered for the mass-mark (adipose fin-clip) at the hatchery and on the spawning ground. Annually record numbers of estimated hatchery (marked) and natural (unmarked).
3.4.1 Fish collected for broodstock are taken throughout the return or spawning period in proportions approximating the timing and age distribution of population from which broodstock is taken.	Temporal and age distribution of broodstock collected, compared to that of naturally-produced population at collection point.	Collect annual run timing, age and sex composition and return timing data.
3.4.3 Life history characteristics of the natural population do not change as a result of the hatchery program.	Life history characteristics are measured in adult and juvenile hatchery fish: return timing, age and sex composition, spawning timing, and size in returning hatchery adults; size, growth rates, and survival to release in juvenile production. Life history patterns of juvenile and adult NOR are stable.	Collect annual run timing, origin, and age and sex composition data. Annually monitor and record juvenile hatchery fish size, growth rates, number released, mass-mark/tag data, survival-to-release rates, and date of release. Examine returning fish for the mass-mark (fin-clips, CWTs) at broodstock collection points and on the spawning grounds. Annually record and report numbers of estimated hatchery (marked) and natural (unmarked).
3.5.1 Patterns of genetic variation within and among natural populations do not change significantly as a result of artificial production.	Within and between populations, genetic structure is not affected by artificial production.	See HGMP section 11 for M&E information.
3.5.2 Collection of broodstock does not adversely impact the genetic diversity of the naturally-spawning population.	Total number of natural-origin spawners (if any) reaching the collection facility. Timing of collection compared to overall run timing.	All on-station hatchery releases are identifiable in some manner (fin-marks, tags, etc.). Collect annual run timing, origin, and age and sex composition data. Examine returning fish for the mass-mark (fin-clips) at broodstock collection points and on the spawning grounds. Annually record and report numbers of estimated hatchery (marked) and natural (unmarked).
3.5.2 Collection of broodstock does not adversely impact the genetic diversity of the naturally-spawning population.	Total number of natural-origin spawners (if any) reaching the collection facility. Timing of collection compared	All on-station hatchery releases are identifiable in some manner (fin-marks, tags, etc.). Collect annual run timing, origin,

	to overall run timing.	and age and sex composition data. Examine returning fish for the mass-mark (fin-clips) at broodstock collection points and on the spawning grounds. Annually record and report numbers of estimated hatchery (marked) and natural (unmarked).
3.5.3 Hatchery-origin adults in natural production areas do not negatively affect the total natural spawning population.	The ratio of observed and/or estimated total numbers of artificially-produced fish on natural spawning grounds, to total number of naturally-produced fish (pHOS).	This program is projected to meet HSRG standards for pHOS based on the AHA modeling tool (All-H Analyzer). F1 progeny are not released into the upper watershed (see HGMP section 7.5).
3.5.4 Juveniles are released on-station, or after sufficient acclimation to maximize homing ability to intended return locations.	Location of release (on-station, acclimation pond, direct plant). Release type (forced, volitional or direct stream release). Proportion of adult returns to program's intended return location, compared to fisheries and artificial or natural production areas.	This program is projected to meet HSRG standards for pHOS based on the AHA modeling tool (All-H Analyzer). Annually record and report release information, including location, method and age class in hatchery data systems (WDFW Hatcheries Headquarters Database).
3.5.5 Juveniles are released at fully-smolted stage.	Level of smoltification at release. Release type (forced, volitional or direct).	Annually monitor and record size, number, date of release and release type.
3.7.1 Hatchery facilities are operated in compliance with all applicable fish health guidelines and facility operation standards and protocols (IHOT, PNFHPC, *Salmonid Disease Control Policy of the Fisheries Co-Managers of Washington State*).	Annual reports indicating levels of compliance with applicable standards and criteria. Periodic audits indicating level of compliance with applicable standards and criteria.	Pathologists from WDFW's Fish Health Section monitor program monthly. Exams performed at each life stage may include tests for virus, bacteria, parasites and/or pathological changes, as needed. See also **Attachment 1** for pre-release Fish Health History. The program is operated consistent with the *Salmonid Disease Control Policy of the Fisheries Co-Managers of Washington State* (WDFW and WWTIT 1998, updated 2006), *Fish Health Policy in the Columbia Basin*, and *Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries* (Fish Health Policy Chapter 5, IHOT 1995).
3.7.2 Effluent from hatchery facility will not detrimentally affect natural populations.	Discharge water quality compared to applicable water quality standards by NPDES	Flow and discharge reported in monthly NPDES reports.

	permit. WDFW water right permit compliance.	
3.7.3 Water withdrawals and in-stream water diversion structures for artificial production facility operation will not prevent access to natural spawning areas, affect spawning behavior of natural populations, or impact juvenile rearing environment.	Water withdrawals compared to NMFS, USFWS and WDFW applicable passage and screening criteria for juveniles and adults.	Barrier and intake structure compliance assessed and needed fixes are prioritized.
3.7.4 Releases do not introduce pathogens not already existing in the local populations, and do not significantly increase the levels of existing pathogens. Follow the *Salmonid Disease Control Policy of the Fisheries Co-Managers of Washington State* (WDFW and WWTIT 1998, revised 2006).	Necropsies of fish to assess health, nutritional status, and culture conditions.	DFW Fish Health Section inspect adult broodstock yearly for pathogens and monitor juvenile fish on a monthly basis to assess health and detect potential disease problems. A fish health database will be maintained to identify trends in fish health and disease and implement fish health management plans based on findings.
	Release and/or transfer exams for pathogens and parasites.	Examine fish 1 to 6 weeks prior to transfer or release, in accordance with the *Salmonid Disease Control Policy of the Fisheries Co-Managers of Washington State* (WDFW and WWTIT 1998, updated 2006).
	Inspection of adult broodstock for pathogens and parasites.	At spawning, lots of 60 adult broodstock are examined for pathogens.
	Inspection of off-station fish/eggs prior to transfer to hatchery for pathogens and parasites.	Controls of specific fish pathogens through eggs/fish movements are conducted in accordance to the *Salmonid Disease Control Policy of the Fisheries Co-Managers of Washington State* (WDFW and WWTIT 1998, updated 2006).
3.7.6 Adult broodstock collection operation does not significantly alter spatial and temporal distribution of any naturally-produced population.	Spatial and temporal spawning distribution of natural populations above and below broodstock collection site is currently compared to historic distribution.	Trap is checked daily. Non-target listed fish, when encountered, are returned to the river.
3.7.7 Weir/trapping operations do not result in significant stress, injury or mortality in natural populations.	Mortality rates in trap. Pre-spawning mortality rates of captured fish in the hatchery and/or after release.	Traps checked daily. Annually record and report abundances and observations of natural-origin fish at hatchery facilities.
3.7.8 Predation by artificially produced fish on naturally – produced fish does not significantly reduce numbers of	Hatchery juveniles are raised to smolt-size and released from the hatchery at a time that fosters rapid migration downstream.	Hatchery smolt release size and time are monitored to quantify/minimize predation effects on naturally-origin

natural fish.		salmon and steelhead (Sharpe et al. 2008).
3.8.1 Cost of program operation does not exceed the net economic value of fisheries in dollars per fish for all fisheries targeting this population.	Total cost of operation.	Compare annual operational cost of program to calculated fishery contribution value (Wegge 2009).
3.8.2. Juvenile production costs are comparable to or less than other regional programs designed for similar objectives.	Total cost of program operation.	Annually monitor and report feed costs and fish health actions.

1.11 Expected size of program.

1.11.1 Proposed annual broodstock collection level (maximum number of adult fish).

Up to 80 adults (no more than 30% of the run) are collected to achieve an egg take goal of 90,000 (FBD).

1.11.2 Proposed annual fish release levels (maximum number) by life stage and location.

Table 1.11.2.1: Proposed annual fish release levels (maximum number) by life stage and location.

Age Class	Max. No.	Size (fpp)	Release Date	Location	Major Watershed
Yearlings	45,000	5.5	April/May	Kalama River	Kalama Sub-Basin

Source: Future Brood Document 2014.

The maximum number that may be released (if, for example, wild broodstock winter-run replace the traditional stock) is 90,000 smolts. Due to IHNV, fish may be transferred to Fallert Creek or Kalama Falls Hatcheries.

1.12 Current program performance, including estimated smolt-to-adult survival rates, adult production levels, and escapement levels. Indicate the source of these data.

See **Table 3.3.1.1**.

1.13 Date program started (years in operation), or is expected to start.

This program was initiated in BY 1998 (Sharpe et al. 2000).

1.14 Expected duration of program.

Program is on-going, with no plans for termination.

1.15 Watersheds targeted by program.

Kalama River (WRIA 27.0002)/ Kalama Subbasin/ Lower Columbia Province.

1.16 Indicate alternative actions considered for attaining program goals, and reasons why those actions are not being proposed.

1.16.1 Brief Overview of Key Issues.

WDFW's research project on the Kalama River provides information on the feasibility of using the native population. This alternative would require utilizing the local stock, which could not occur without better knowledge of the condition of the wildstock. This is a limited research program to evaluate the feasibility of rearing wild steelhead in the hatchery, and could be a template to recover wild steelhead stocks in other regional areas in the lower Columbia basin.

Hatchery winter steelhead returning to Kalama Falls are mark-identified (opercle punch or caudal fin-punch) and recycled downstream (released near the Sportsman's Loop lower Kalama River public water access site at R.M. 0.7) to provide maximum harvest. If they are trapped at Kalama Falls and are ripe, they are donated to a food bank or taken to Kress Lake for landlocked sport fishing opportunity. Any adults that escape the fishery may spawn in the system, but the barrier at Kalama Falls provides a measure of separation between the hatchery steelhead and the main spawning area of the wild winter steelhead passed above Kalama Falls Hatchery. Only natural-origin adults are passed into the upper Kalama basin.

1.16.2 Potential Alternatives to the Current Program

Alternative 1: *Eliminate the program:* This action would reduce potential interaction with natural populations and eliminate potential impacts on other ESA-listed species. Currently this program supports popular sport fisheries in the lower Columbia River, and is consistent with the mitigation requirements.

1.16.3 Potential Reforms and Investments

Reform/Investment 1: Address passage facilities at Kalama Falls. Fish passage at Kalama Falls is managed by the Kalama Falls fish barrier and fish ladder. This system is antiquated and needs to be modernized into a sorting, moving, and loading system that will use water in the connivance of adult fish, and cause no harm to wild or hatchery fish. Currently, design work is being conducted to address these issues.

Reform/Investment 2: *Modify intake screens at Fallert Creek to meet fish passage criteria.* The Kalama River water intake at Fallert Creek intake does not meet the current *Anadromous Salmonid Passage Facility Design* criteria (NMFS 2011). A feasibility report for the river intake was funded in 2011, and completed in 2012. WDFW is in the process of designing a new river intake system to meet NOAA-NMFS compliance (Mitchell Act Intake and Fish Passage Study Report 2003), and has included it in the 2013-2015 Capital Budget Request.

Reform/Investment 3: *Provide adequate space and water*. If the adult transport system incorporates better holding and sorting facilities in the large adult holding/rearing ponds, it will provide additional space and water to the ponds during the rearing cycle. Some investment into the methods and potential efficiencies needs to take place as well.

2 SECTION 2. PROGRAM EFFECTS ON NMFS ESA-LISTED SALMONID POPULATIONS. (USFWS ESA-Listed Salmonid Species and Non-Salmonid Species are addressed in Addendum A)

2.1 List all ESA permits or authorizations in hand for the hatchery program.

None currently. This HGMP is submitted to the NOAA Fisheries for ESA consultation and take prohibition exemption under ESA section 4(d) or 10.

2.2 Provide descriptions, status, and projected take actions and levels for NMFS ESA-listed natural populations in the target area.

2.2.1 Description of NMFS ESA-listed salmonid population(s) affected by the program.

- Identify the NMFS ESA-listed population(s) that will be directly affected by the program.

Lower Columbia River steelhead (*Oncorhynchus mykiss*). Listed as a threatened species on March 19, 1998 (63FR13347); threatened status reaffirmed on January 5, 2006 (70FR37160); reaffirmed threatened by five-year status review, completed August 15, 2011 (76 FR 50448).

- Identify the NMFS ESA-listed population(s) that may be incidentally affected by the program.

Lower Columbia River Chinook (*Oncorhynchus tshawytscha*). Listed as "threatened" on March 24, 1999 (64FR14308); threatened status reaffirmed on June 28, 2005 (70FR37160); reaffirmed threatened by five-year status review, completed August 15, 2011 (76 FR 50448).

Lower Columbia River coho (*Oncorhynchus kisutch*). Identified as a candidate species on June 25, 1995 (60FR38011). Listed as threatened on June 28, 2005 (70FR37160); reaffirmed threatened by five-year status review, completed August 15, 2011 (76 FR 50448).

Columbia River chum salmon (*Oncorhynchus keta*). Listed as threatened on March 25, 1999 (64FR14507); threatened status reaffirmed on June 28, 2005 (70FR37160); reaffirmed threatened by five-year status review, completed August 15, 2011 (76 FR 50448).

Kalama River eulachon (*Thaleichthys pacificus*): The Southern Distinct Population Segment (DPS) of Pacific eulachon was listed as *Threatened* under the ESA on May 17, 2010 (75 FR 13012).

2.2.2 Status of NMFS ESA-listed salmonid population(s) affected by the program.

- Describe the status of the listed natural population(s) relative to "critical" and "viable" population thresholds.

Lower Columbia River Chinook: In Washington, the LCR Chinook ESU includes all naturally spawned Chinook populations from the mouth of the Columbia to a transitional point between Washington and Oregon east of the Hood River and the White Salmon River, as well as fifteen artificial propagation programs. Excluded are Upper Columbia River bright hatchery stocks that spawn in the mainstem Columbia River below Bonneville Dam and in other tributaries upstream from the Sandy River to the Hood and White Salmon rivers (NMFS 2014 79FR20802).

Status: Today only two of 32 historical populations – the North Fork Lewis and Sandy late-fall populations – are considered viable. Most populations (26 out of 32) have a very low probability of persistence over the next 100 years, and some populations are extirpated, or nearly so. Five of the six strata fall significantly short of the Willamette- Lower Columbia Technical Recovery Team (WLC TRT) criteria for viability. One stratum – Cascade late fall – meets the WLC TRT criteria (Dornbush and Sihler 2013). Dam construction eliminated habitat for a number of populations leading to the extirpation of spring Chinook salmon populations in the Upper Cowlitz, Cispus, Tilton, North Fork Lewis , Big White Salmon rivers, and fall Chinook populations in the Upper Cowlitz and Big White Salmon rivers (SHIEER, NMFS 2004). Projects to allow access have been initiated in the Cowlitz and Lewis systems but these are not close to producing self-sustaining populations; Condit Dam on the Big White Salmon River was breached October 26, 2011. Based on the 2010 recovery plan analyses, all of the 14 Tule populations (**Table 2.2.2.1**) are considered very high risk except one that is considered at high risk. The modeling conducted in association with Tule harvest management suggests that three of the populations (Coweeman, Lewis and Washougal) are at a somewhat lower risk (LCFRB 2010).

Table 2.2.2.1: Baseline viability status, viability and abundance objectives, and productivity improvement targets for lower Columbia River Chinook populations.

		Baseline viability					Prod.	Abundance		
Population	**Contribution**	**A&P**	**S**	**D**	**Net**	**Obj.**	**target**	**Historical**	**Baseline**	**Target**
Coast Fall										
Grays/Chinook	Contributing[2]	VL	H	VL	VL[2]	M+	+500%	800	<50	1,000
Eloch/Skam [C]	Primary	VL	H	L	VL[2]	H	+150%	3,000	<50	1,500
Mill/Aber/Germ	Primary[1]	VL	H	L	VL[2]	H	+155%	2,500	50	900
Youngs Bay (OR)	Stabilizing	--[3]	--[3]	--[3]	L	L	--[3]	--[3]	--[3]	--[3]
Big Creek (OR) [C]	Contributing[1]	--[3]	--[3]	--[3]	VL	L	--[3]	--[3]	--[3]	--[3]
Clatskanie (OR)	Primary	--[3]	--[3]	--[3]	VL	H	--[3]	--[3]	--[3]	--[3]
Scappoose (OR)	Primary[1]	--[3]	--[3]	--[3]	L	H	--[3]	--[3]	--[3]	--[3]
Cascade Fall										
Lower Cowlitz [C]	Contributing	VL	H	M	VL[2]	M+	+50%	24,000	500	3,000
Upper Cowlitz	Stabilizing	VL	VL	M	VL	VL	--	28,000	0	--
Toutle[C]	Primary[1]	VL	H	M	VL[2]	H+	+265%	11,000	<50	4,000
Coweeman [G]	Primary	VL	H	H	VL[2]	H+	+80%	3,500	100	900
Kalama	Contributing[2]	VL	H	M	VL[2]	M	+110%	2,700	<50	500
Lewis [G]	Primary	VL	H	H	VL[2]	H+	+280%	2,600	<50	1,500
Salmon	Stabilizing	VL	H	M	VL	VL	--	n/a	<50	--
Washougal	Primary	VL	H	M	VL[2]	H+	+190%	2,600	<50	1,200
Clackamas (OR) [C]	Contributing	--[3]	--[3]	--[3]	VL	M	--[3]	--[3]	--[3]	--[3]
Sandy (OR)	Contributing[1]	--[3]	--[3]	--[3]	VL	M	--[3]	--[3]	--[3]	--[3]
Cascade L Fall										
Lewis NF [C,G]	Primary	VH	H	H	VH[1]	VH	0%	23,000	7,300	7,300
Sandy (OR) [C,G]	Primary	--[3]	--[3]	--[3]	H	VH	--[3]	--[3]	--[3]	--[3]
Cascade Spring										
Upper Cowlitz [C,G]	Primary	VL	L	M	VL[2]	H+	>500%	22,000	300	1,800
Cispus [C,G]	Primary	VL	L	M	VL[2]	H+	>500%	7,800	150	1,800
Tilton	Stabilizing	VL	VL	VL	VL	VL	0%	5,400	<100	--
Toutle	Contributing	VL	H	L	VL	M	>500%	3,100	100	1,100
Kalama	Contributing[2]	VL	H	L	VL	L	>500%	4,900	100	300
Lewis NF [C]	Primary	VL	L	M	VL	H	>500%	15,700	300	1,500
Sandy (OR) [C,G]	Primary	--[3]	--[3]	--[3]	M	H	--[3]	--[3]	--[3]	--[3]
Gorge Fall										
L. Gorge (WA/OR)	Contributing	VL	M	L	VL[2]	M	>500%	n/a	<50	1,200
U. Gorge (WA/OR) [C]	Contributing[1]	VL	M	L	VL[2]	M	>500%	n/a	<50	1,200
White Salmon [C]	Contributing	VL	L	L	VL	M	>500%	n/a	<50	500
Hood (OR)	Primary[4]	--[3]	--[3]	--[3]	VL	H	--[3]	--[3]	--[3]	--[3]
Gorge Spring										
White Salmon [C]	Contributing	VL	VL	VL	VL	L+	>500%	n/a	<50	500
Hood (OR)	Primary	--[3]	--[3]	--[3]	VL	VH	--[3]	--[3]	--[3]	--[3]

Source: LCFRB 2010.
L = Low; M = Moderate; H = High; VH/E = Very High/Extinct.
[1] Increase relative to interim Plan.
[2] Reduction relative to interim Plan.
[3] Addressed in Oregon Management Unit plan.
[C] Designated as a historical core population by the TRT.
[G] Designated as a historical legacy population by the TRT.

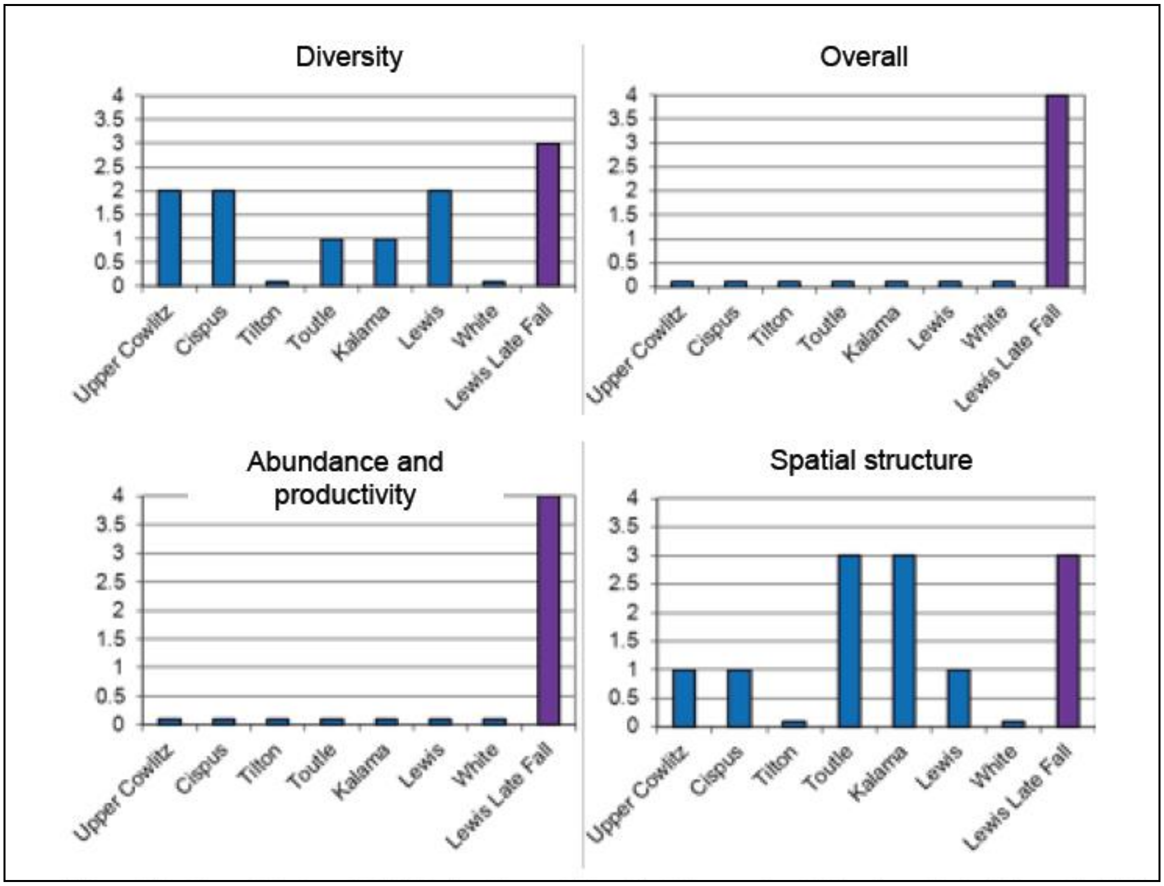

Figure 2.2.1: Current status of Washington lower Columbia River spring Chinook and late fall-run (bright) Chinook salmon populations for the VSP parameters and overall population risk. (LCFRB Recovery Plan 2010, chapter 6). A population score of zero indicates a population extirpated or nearly so, a score of 1 is high risk, 2 is moderate risk, 3 is low risk ("viable") and 4 is very low risk (Ford 2011).

Lower Columbia River Steelhead *(Oncorhynchus mykiss*): The DPS includes all naturally spawned anadromous *O. mykiss* (steelhead) populations below natural and manmade impassable barriers in streams and tributaries to the Columbia River between the Cowlitz and Wind Rivers, Washington (inclusive), and the Willamette and Hood Rivers, Oregon (inclusive), and excludes fish originating from the upper Willamette River Basin above Willamette Falls.The DPS includes seven artificial propagation programs, including the Cowlitz Trout Hatchery Winter-late (Lower Cowlitz), Kalama River Wild (winter- and summer-run) and Lewis River Wild Winter (NMFS 2014 79FR20802).

Status: Today, 16 of the 23 Lower Columbia River steelhead populations have a low or very low probability of persisting over the next 100 years, and six populations have a moderate probability of persistence. Only the summer-run Wind population is considered viable. All four strata in the DPS fall short of the WLC TRT criteria for viability (Dornbush and Sihler 2013). Populations in the upper Lewis and Cowlitz watersheds remain cut-off from access to essential spawning habitat by hydroelectric dams. Projects to allow access have been initiated in the Cowlitz and Lewis systems but these have not yet produced self-sustaining populations (Ford 2011). Condit Dam on the White Salmon River was breached October 26, 2011. WDFW is currently developing watershed-specific management plans in accordance with the SSMP. As part of this planning process, WDFW is proposing to complete a thorough review of current steelhead stock status using the most up to date estimates of adult abundance, juvenile production and genetic information.

Table 2.2.2.2: Baseline viability status, viability and abundance objectives, and productivity improvement targets for lower Columbia River steelhead populations.

		Baseline viability					Prod.	Abundance		
Population	**Contribution**	**A&P**	**S**	**D**	**Net**	**Obj.**	**target**	**Historical**	**Baseline**	**Target**
Coast Winter										
Grays/Chinook	Primary	VH	VH	M	M[1]	H	0%[4]	1,600	800	800
Eloch/Skam	Contributing	VH	VH	M	M[1]	M+	0%[4]	1,100	600	600
Mill/Ab/Germ	Primary	H	VH	M	M[1]	H	0%[4]	900	500	500
Youngs Bay (OR)	Primary	--[3]	--[3]	--[3]	VH	VH	--[3]	--[3]	--[3]	--[3]
Big Creek (OR)	Primary	--[3]	--[3]	--[3]	H	VH	--[3]	--[3]	--[3]	--[3]
Clatskanie (OR)	Primary	--[3]	--[3]	--[3]	VH	VH	--[3]	--[3]	--[3]	--[3]
Scappoose (OR)	Primary	--[3]	--[3]	--[3]	VH	VH	--[3]	--[3]	--[3]	--[3]
Cascade Winter										
Lower Cowlitz	Contributing	L	M	M	L	M	+5%	1,400	350	400
Upper Cowlitz [C,G]	Primary	VL	M	M	VL[2]	H[1]	>500%	1,400	<50	500
Cispus [C,G]	Primary	VL	M	M	VL[2]	H[1]	>500%	1,500	<50	500
Tilton	Contributing	VL	M	M	VL	L	>500%	1,700	<50	200
S.F. Toutle	Primary	M	VH	H	M	H+	+35%	3,600	350	600
N.F. Toutle [C]	Primary	VL	H	H	VL[2]	H	+125%		120	600
Coweeman	Primary	L	VH	VH	L[2]	H	+25%	900	350	500
Kalama	Primary	L	VH	H	L[2]	H+	+45%	800	300	600
N.F. Lewis [C]	Contributing	VL	M	M	VL[2]	M	>500%	8,300	150	400
E.F. Lewis	Primary	M	VH	M	M[1]	H	+25%	900	350	500
Salmon	Stabilizing	VL	H	M	VL[2]	VL	0%	na	<50	--
Washougal	Contributing	L	VH	M	L[2]	M	+15%	800	300	350
Clackamas (OR) [C]	Primary	--[3]	--[3]	--[3]	M	H	--[3]	--[3]	--[3]	--[3]
Sandy (OR) [C]	Primary	--[3]	--[3]	--[3]	L	VH	--[3]	--[3]	--[3]	--[3]
Cascade Summer										
Kalama [C]	Primary	H	VH	M	M[1]	H	0%[4]	1,000	500	500
N.F. Lewis	Stabilizing	VL	VL	VL	VL	VL	0%	na	150	--
E.F. Lewis [G]	Primary	VL	VH	M	VL[2]	H	>500%	600	<50	500
Washougal [C,G]	Primary	M	VH	M	M[1]	H	+40%	2,200	400	500
Gorge Winter										
L. Gorge (WA/OR)	Primary	L	VH	M	L[2]	H	+45%	na	200	300
U. Gorge (WA/OR)	Stabilizing	L	M	M	L[2]	L	0%	na	200	--
Hood (OR) [C,G]	Primary	--[3]	--[3]	--[3]	M	H	--[3]	--[3]	--[3]	--[3]
Gorge Summer										
Wind [C]	Primary	VH	VH	H	H[1]	VH	0%[4]	na	1,000	1,000
Hood (OR)	Primary	--[3]	--[3]	--[3]	VL	H	--[3]	--[3]	--[3]	--[3]

Source: LCFRB 2010.
L = Low; M = Moderate; H = High; VH/E = Very High/Extinct.
[1] Increase relative to interim Plan.
[2] Reduction relative to interim Plan.
[3] Addressed in Oregon Management Unit plan.
[4] Improvement increments are based on abundance and productivity; however, this population will require improvement in spatial structure or diversity to meet recovery objectives.
[C] Designated as a historical core population by the TRT.
[G] Designated as a historical legacy population by the TRT.

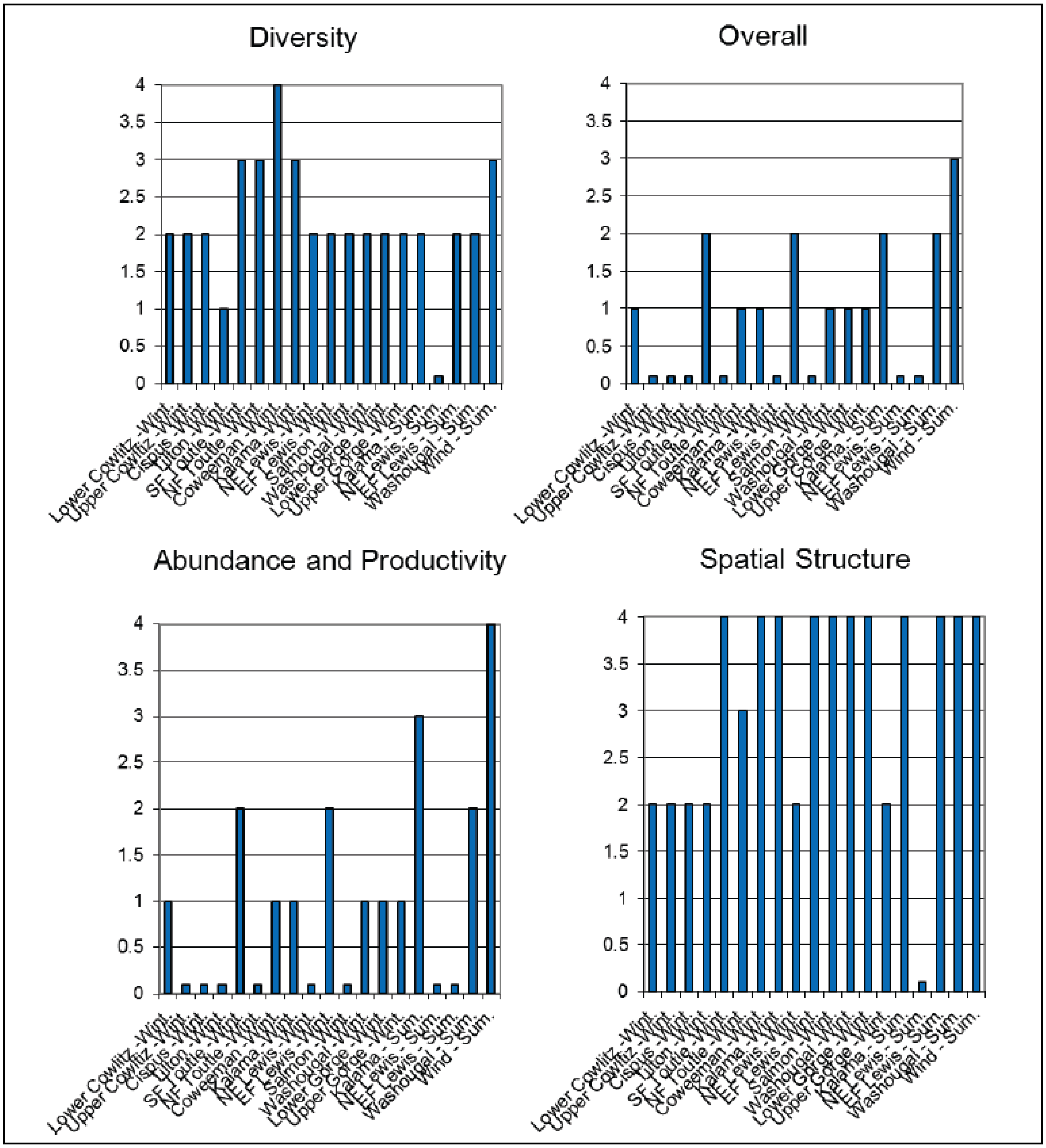

Figure 2.2.2: Current status of Washington LCR steelhead populations for the VSP parameters and overall population risk. (LCFRB 2010 Recovery Plan, chapter 6). A population score of zero indicates a population extirpated or nearly so, a score of 1 is high risk, 2 is moderate risk, 3 is low risk ("viable") and 4 is very low risk (Ford 2011).

Lower Columbia River coho *(Oncorhynchus kisutch)*: Originally part of a larger Lower Columbia River/Southwest Washington ESU, Lower Columbia coho were identified as a separate ESU and listed as threatened on June 28, 2005. The ESU includes all naturally spawned populations of coho salmon in the Columbia River and its tributaries in Washington and Oregon, from the mouth of the Columbia up to and including the Big White Salmon and Hood Rivers, The twenty-one artificial propagation programs include: the Grays River, Peterson Coho Project, Cowlitz Type-N Coho Program in the Upper and Lower Cowlitz Rivers, Cowlitz Game and Anglers Coho Program, Friends of the Cowlitz Coho Program, North Fork Toutle River Hatchery, Kalama River Type-N and Type-S Coho Programs, Lewis River Type-N and Type-S

Coho programs, Fish First Wild Coho and Type-N Coho programs, Syverson Project Type-N Coho Program, and Washougal Hatchery Type-N Coho Program (NMFS 2014 79FR20802).

Status: Status evaluations of LCR coho status, all based on WLC-TRT criteria, have been conducted since the last BRT status update in 2005 (McElhany et al. 2007, Beamesderfer et al. 2010, LCFRB 2010, Dornbusch and Sihler 2013). All of these evaluations concluded that the ESU is currently at very high risk of extinction. All of the Washington side populations are considered at very high risk, although uncertainty is high because of a lack of adult spawner surveys. The 2005 BRT evaluation noted that smolt traps indicate some natural production in Washington populations, though given the high fraction of hatchery origin spawners suspected to occur in these populations it is not clear that any are self-sustaining (Ford 2011). Since this time WDFW has implemented an ESU wide monitoring program for LCR coho which began in 2010. Preliminary results indicate that natural origin population abundance may be higher than previously thought for certain populations (WDFW, unpublished). Results from the first 3 years of monitoring should be available in the near future. Currently, 21 of the 24 Lower Columbia River coho salmon populations are considered to have a very low probability of persisting over the next 100 years, and none is considered viable (Dornbusch and Sihler 2013). All three strata in the ESU fall significantly short of the WLC TRT criteria for viability.

Table 2.2.2.3: Baseline viability status, viability and abundance objectives, and productivity improvement targets for lower Columbia River coho populations.

		Baseline viability					Prod.	Abundance		
Population	Contribution	A&P	S	D	Net	Obj.	target	Historical	Baseline	Target
Coast										
Grays/Chinook [L]	Primary	VL	H	VL	VL[2]	H	+370%	3,800	<50	2,400
Eloch/Skam [L]	Primary	VL	H	VL	VL[2]	H	+170%	6,500	<50	2,400
Mill/Ab/Germ [L]	Contributing	VL	H	L	VL[2]	M	>500%	2,800	<50	1,800
Youngs (OR) [L]	Stabilizing	--[3]	--[3]	--[3]	VL	VL	--[3]	--[3]	--[3]	--[3]
Big Creek (OR) [L]	Stabilizing[2]	--[3]	--[3]	--[3]	VL	VL	--[3]	--[3]	--[3]	--[3]
Clatskanie (OR) [L]	Primary[1]	--[3]	--[3]	--[3]	L	VH	--[3]	--[3]	--[3]	--[3]
Scappoose (OR) [L]	Primary	--[3]	--[3]	--[3]	M	VH	--[3]	--[3]	--[3]	--[3]
Cascade										
Lower Cowlitz [L]	Primary	VL	M	M	VL[2]	H	+100%	18,000	500	3,700
Upper Cowlitz [E, L]	Primary[1]	VL	M	L	VL	H[1]	>500%	18,000	<50	2,000
Cispus [E, L]	Primary[1]	VL	M	L	VL	H[1]	>500%	8,000	<50	2,000
Tilton [E, L]	Stabilizing[2]	VL	M	L	VL	VL[2]	0%	5,600	<50	--
Toutle SF [E, L]	Primary	VL	H	M	VL[2]	H	+180%	27,000	<50	1,900
Toutle NF [E, L]	Primary	VL	M	L	VL[2]	H	+180%		<50	1,900
Coweeman [L]	Primary	VL	H	M	VL[2]	H	+170%	5,000	<50	1,200
Kalama [L]	Contributing	VL	H	L	VL[2]	L	>500%	800	<50	500
NF Lewis [E, L]	Contributing	VL	L	L	VL[2]	L	+50%	40,000	200	500
EF Lewis [E, L]	Primary	VL	H	M	VL[2]	H	>500%	3,000	<50	2,000
Salmon [L]	Stabilizing	VL	M	VL	VL	VL	0%	na	<50	--
Washougal [L]	Contributing	VL	H	L	VL[2]	M+	>500%	3,000	<50	1,500
Clackamas (OR) [E, L]	Primary	--[3]	--[3]	--[3]	M	VH	--[3]	--[3]	--[3]	--[3]
Sandy (OR) [E, L]	Primary	--[3]	--[3]	--[3]	VL	H	--[3]	--[3]	--[3]	--[3]
Gorge										
L Gorge (WA/OR) [L]	Primary	VL	M	VL	VL[2]	H	+400%	na	<50	1,900
U Gorge (WA) [L]	Primary[1]	VL	M	VL	VL[2]	H	+400%	na	<50	1,900
U Gorge/Hood (OR)[E]	Contributing[4]	--[3]	--[3]	--[3]	VL	H	--[3]	--[3]	--[3]	--[3]

Source: LCFRB 2010.
L = Low; M = Moderate; H = High; VH/E = Very High/Extinct.
[1] Increase relative to interim Plan.
[2] Reduction relative to interim Plan.
[3] Addressed in Oregon Management Unit plan.
[4] Improvement increments are based on abundance and productivity; however, this population will require improvement in spatial structure or diversity to meet recovery objectives.
[E] Early run (Type S) coho stock.
[L] Late run (Type N) coho stock.
(Core and Legacy populations not designated by the TRT for coho).

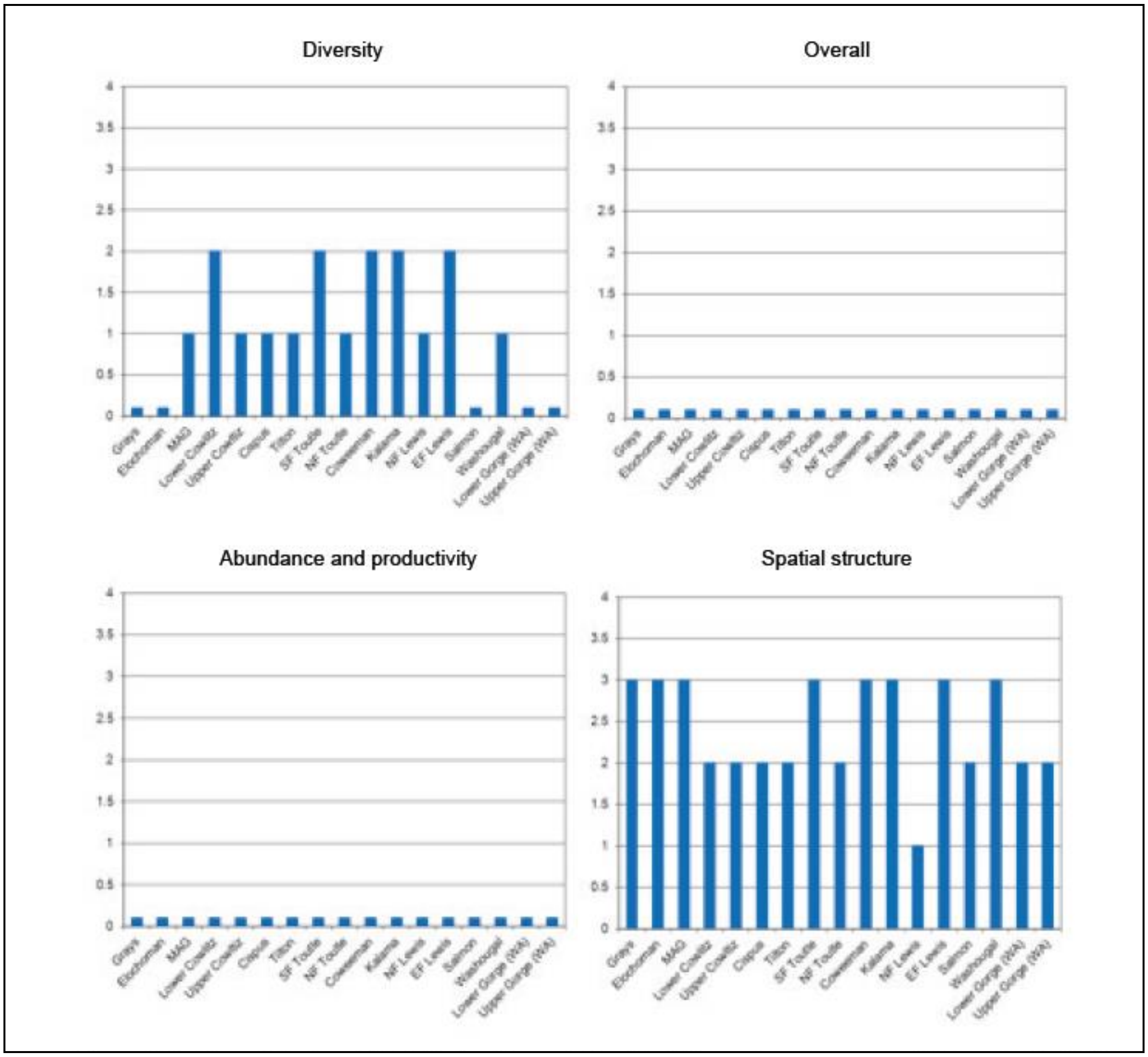

Figure 2.2.3: Current status of Washington LCR coho populations for the VSP parameters and overall population risk. (LCFRB 2010 recovery plan, chapter 6). A population score of zero indicates a population extirpated or nearly so, a score of 1 is high risk, 2 is moderate risk, 3 is low risk ("viable") and 4 is very low risk (Ford 2011).

Columbia River chum salmon (*Oncorhynchus keta*). ESU includes all naturally spawned populations of chum salmon in the Columbia River and its tributaries in Washington and Oregon, as well as artificial propagation programs at Grays River and Washougal River/Duncan Creek chum hatchery programs (NMFS 2014 79FR20802).

Status: The LCFRB completed a revision recovery plan in 2010 that includes Washington populations of Columbia River chum salmon. This plan includes an assessment of the current status of Columbia River chum populations, which relied and built on the viability criteria developed by the WLC-TRT (McElhany et al. 2006) and an earlier evaluation of Oregon WLC populations (McElhany et al. 2007). This evaluation assessed the status of populations with regard to the VSP parameters of A/P, spatial structure, and diversity (McElhany et al. 2000). The result of this analysis is shown in **Figure 2.2.2.3**. The analysis indicates that all of the Washington populations with two exceptions are in the overall very high risk category (also described as extirpated or nearly so). The Grays River population was considered to be at moderate risk and the Lower Gorge population to be at low risk. The very high risk status assigned to the majority of Washington populations (and all the Oregon populations) reflects the very low abundance observed in these populations (e.g., <10 fish/year) (Ford 2011). Today, 15 of the 17 populations that historically made up this ESU are so depleted that either their baseline probability of persistence is very low or they are extirpated or nearly so; this is the case for all six of the Oregon populations. Currently almost all natural production occurs in just two populations: Grays/Chinook and the Lower Gorge. All three strata in the ESU fall significantly short of the WLC TRT criteria for viability (Dornbush and Sihler 2013).

Table 2.2.2.4: Baseline viability status, viability and abundance objectives, and productivity improvement targets for lower Columbia River chum populations.

		Baseline viability					Prod.	Abundance		
Population	**Contribution**	**A&P**	**S**	**D**	**Net**	**Obj.**	**target**	**Historical**	**Baseline**	**Target**
Coast										
Grays/Chinook [C,G]	Primary	VH	M	H	M[1]	VH	0%[4]	10,000	1,600	1,600
Eloch/Skam [C]	Primary	VL	H	L	VL[2]	H	>500%	16,000	<200	1,300
Mill/Ab/Germ	Primary	VL	H	L	VL	H	>500%	7,000	<100	1,300
Youngs (OR) [C]	Stabilizing[2]	--[3]	--[3]	--[3]	VL	VL	--[3]	--[3]	--[3]	--[3]
Big Creek (OR) [C]	Stabilizing[2]	--[3]	--[3]	--[3]	VL	VL	--[3]	--[3]	--[3]	--[3]
Clatskanie (OR)	Primary[1]	--[3]	--[3]	--[3]	VL	H	--[3]	--[3]	--[3]	--[3]
Scappoose (OR)	Primary[1]	--[3]	--[3]	--[3]	VL	H	--[3]	--[3]	--[3]	--[3]
Cascade										
Cowlitz (Fall) [C]	Contributing	VL	H	L	VL	M	>500%	195,000	<300	900
Cowlitz (Summer) [C]	Contributing	VL	L	L	VL	M	>500%	n/a	n/a	900
Kalama	Contributing	VL	H	L	VL	M	>500%	20,000	<100	900
Lewis [C]	Primary	VL	H	L	VL	H	>500%	125,000	<100	1,300
Salmon	Stabilizing	VL	L	L	VL	VL	0%	n/a	<100	--
Washougal	Primary	VL	H	L	VL[2]	H+	>500%	18,000	<100	1,300
Clackamas (OR) [C]	Contributing	--[3]	--[3]	--[3]	VL	M	--[3]	--[3]	--[3]	--[3]
Sandy (OR)	Primary	--[3]	--[3]	--[3]	VL	H	--[3]	--[3]	--[3]	--[3]
Gorge										
L. Gorge (WA/OR) [C,G]	Primary	VH	H	VH	H[1]	VH	0%[4]	6,000	2,000	2,000
U. Gorge (WA/OR)	Contributing	VL	L	L	VL	M	>500%	11,000	<50	900

Source: LCFRB 2010.

L = Low; M = Moderate; H = High; VH/E = Very High/Extinct.

[5] Increase relative to interim Plan.

[6] Reduction relative to interim Plan.

[7] Addressed in Oregon Management Unit plan.

[8] Improvement increments are based on abundance and productivity; however, this population will require improvement in spatial structure or diversity to meet recovery objectives.

[C] Designated as a historical core population by the TRT.

[G] Designated as a historical legacy population by the TRT.

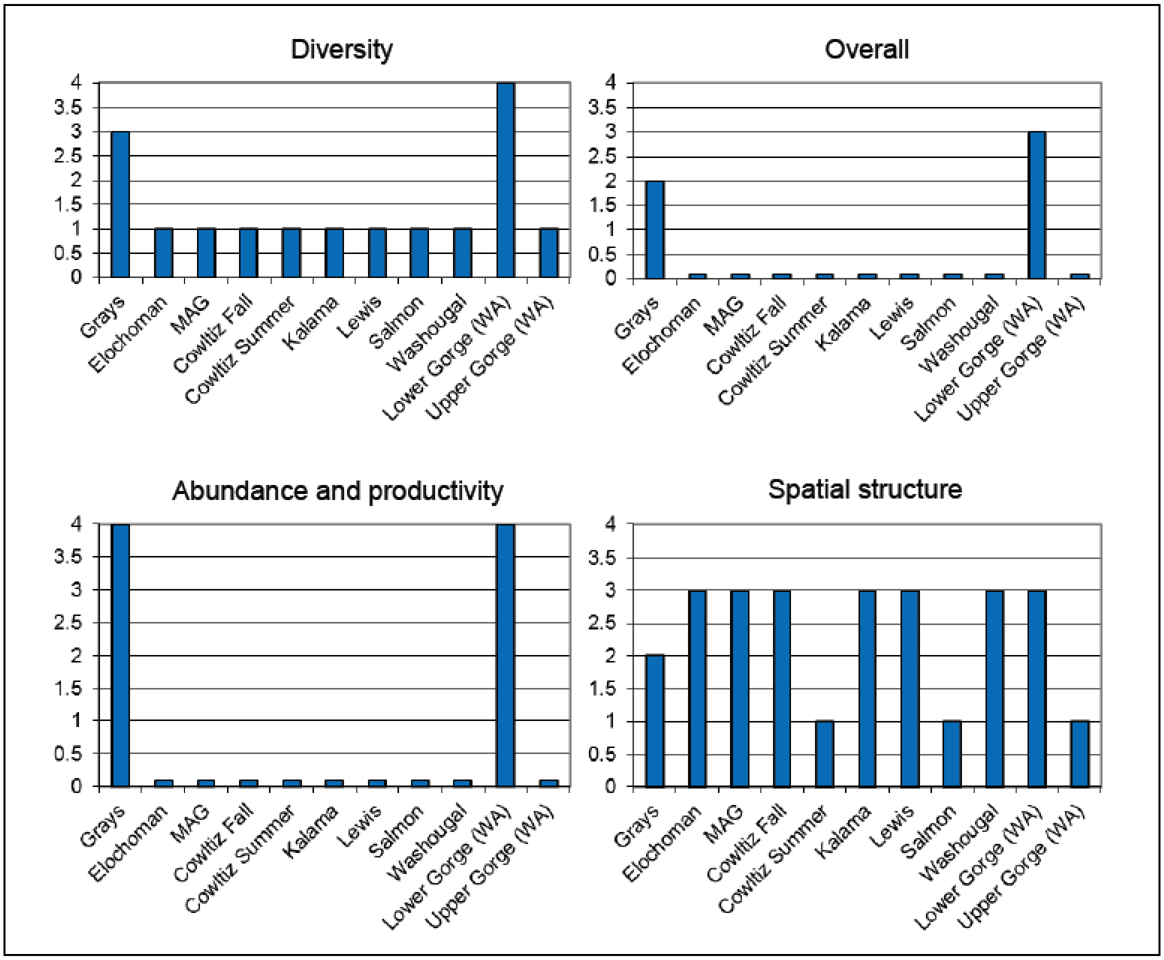

Figure 2.2.4: Current status of Washington CR chum populations for the VSP parameters and overall population risk. (LCFRB 2010 Recovery Plan, Chapter 6). A population score of zero indicates a population extirpated or nearly so, a score of 1 is high risk, 2 is moderate risk, 3 is low risk (“viable”) and 4 is very low risk (Ford 2011).

Kalama River eulachon (*Thaleichthys pacificus*): The Southern Distinct Population Segment (DPS) of Pacific eulachon was listed as *Threatened* under the ESA on May 17, 2010 (75 FR 13012).

Status: The lower Columbia River and its tributaries support the largest known spawning run of eulachon. The main stem of the lower Columbia River provides spawning and incubation sites, and major tributaries in Washington State that have supported runs in the past include the Grays, Elochoman, Cowlitz, Kalama and Lewis Rivers. Eulachon spawn in the Kalama River up to the confluence with Indian Creek and spawning has been confirmed as recently as 2011. The current abundance of eulachon is low and is declining in all surveyed populations throughout the DPS. The major threats and continued causes for declines in eulachon populations include climate change and its impacts on both ocean conditions and freshwater habitat, by-catch in commercial fisheries, dams and water diversions, degraded water quality, dredging and predation (NMFS 2011).

- Provide the most recent 12 year (e.g. 1988-present) progeny-to-parent ratios, survival data by life-stage, or other measures of productivity for the listed population.

Not available for most species. See HGMP section 11.1 for planned M&E. Juvenile coho production estimates is the one measure of production in the Lower Columbia system.

Table 2.2.2.5: Lower Columbia River Washington tributary coho smolt production estimates, 1997-2009 (WDFW, Region 5).

Year	Cedar Creek	Mill Creek	Abernathy Creek	Germany Creek	Cowlitz Falls Dam	Mayfield Dam
1997	-----	-----	-----	-----	3,700	700
1998	38,400	-----	-----	-----	110,000	16,700
1999	28,000	-----	-----	-----	15,100	9,700
2000	20,300	-----	-----	-----	106,900	23,500
2001	24,200	6,300	6,500	8,200	334,700	82,200
2002	35,000	8,200	5,400	4,300	166,800	11,900
2003	36,700	10,500	9,600	6,200	403,600	38,900
2004	37,000	5,700	6,400	5,100	396,200	36,100
2005	58,300	11,400	9,000	4,900	766,100	40,900
2006	46,000	6,700	4,400	2,300	370,000	33,600
2007	29,300	7,000	3,300	2,300	277,400	34,200
2008	36,340	90,97	5,077	3,976	-----	38,917
2009	61,140	62,83	3,761	2,576	-----	29,718
2010	-----	-----	-----	-----	-----	49,171
2011	-----	-----	-----	-----	-----	43,831

Source: LCR FMEP Annual Report 2010 and WDFW Data 2012.

- Provide the most recent 12 year annual spawning abundance estimates, or any other abundance information. Indicate the source of these data.

Table 2.2.2.6: Spring Chinook salmon total spawner abundance estimates in LCR tributaries, 2000-2012.

Year	Cowlitz	Kalama	Lewis
2000	266	34	523
2001	347	578	754
2002	419	898	498
2003	1,953	790	745
2004	1,877	358	529
2005	405	380	122
2006	783	292	857
2007	74	2,150	264
2008	425	364	40
2009	763	34	80
2010	711	0	160
2011	1,359	26	120
2012	1,359	28	200

Source: Joe Hymer, WDFW Annual Database 2012

Table 2.2.2.7: Fall Chinook salmon total spawner abundance estimates in LCR tributaries, 2000-2011[a].

Year	Elochoman River	Coweeman River[a]	Grays River	Skamokawa Creek	Cowlitz River	Green River (Toutle)	SF Toutle River	Kalama River	EF Lewis River	NF Lewis River	Washougal River
2000	884	424	80	482	2,100	1,580	204	3,877	391	6,504	2,757
2001	230	251	104	3	1,979	1,081	102	3,451	245	4,281	1,704
2002	332	566	390	7	3,038	5,654	216	10,560	441	5,518	2,728
2003	2,204	753	149	529	2,968	2,985	327	9,272	607	11,519	2,678
2004	4,796	1,590	745	2,109	4,621	4,188	618	6,680	918	13,987	10,597
2005	6,820	1,090	387	588	10,329	13,846	140	24,782	727	18,913	3,444
2006	7,581	900	82	372	14,427	7,477	450	18,952	1,375	17,106	6,050
2007	194	140	99	36	2,724	961	30	1,521	308	10,934	2,143
2008	782	95	311	253	1,334	824	45	2,617	236	4,268	3,182
2009	231	147	93	139	2,156	1,302	66	4,356	110	6,112	2,995
2010	1,883	1,330	12	268	2,762	605	NE	3,576	314	8,908	4,529
2011	508	2,148	353	41	1,616	668	NE	10,639	334	14,033	2,961

Source: Ron Roler, WDFW Natural Spawn Progress Reports 2012.
* Estimates of total adult and jack fall Chinook. May include fish put upstream of hatchery weirs.

Table 2.2.2.8: Wild winter steelhead escapement estimates for select SW Washington DPS populations, current WDFW escapement goals and LCSRP abundance targets.

Location	Grays River	Elochoman/ Skamokawa	Mill/Abernathy/ Germany
WDFW Escapement Goal	**1,486**	**853**	**508**
LCSRP Abundance Target	**800**	**600**	**500**
2000	1,064	650	380
2001	1,130	656	458
2002	724	370	354
2003	1,200	668	342
2004	1,132	768	446
2005	396	376	274
2006	718	632	398
2007	724	490	376
2008	764	666	528
2009	568	222	396
2010	422	534	398
2011	318	442	270
3-year average	**436**	**399**	**355**
5-year average	**559**	**471**	**394**
10-year average	**697**	**517**	**378**

Source: WDFW Data 2012

Table 2.2.2.9: Wild winter steelhead escapement estimates for select SW Washington DPS populations, current WDFW escapement goals and LCSRP abundance targets.

Location	Coweeman	SF Toutle	NF Toutle/ Green	Kalama	EF Lewis	Washougal
WDFW Escapement Goal	**1,064**	**1,058**	**NA**	**1,000**	**1,243**	**520**
LCSRP Abundance Target	**500**	**600**	**600**	**600**	**500**	**350**
2000	530	490	----	921	NA	NA
2001	384	348	----	1,042	377	216
2002	298	640	----	1,495	292	286
2003	460	1,510	----	1,815	532	764
2004	722	1,212	----	2,400	1,298	1,114
2005	370	520	388	1,856	246	320
2006	372	656	892	1,724	458	524
2007	384	548	565	1,050	448	632
2008	722	412	650	776	548	732
2009	602	498	699	1,044	688	418
2010	528	274	508	961	336	232
2011	408	210	416	622	308	204
3-year average	**513**	**327**	**541**	**876**	**444**	**285**
5-year average	**529**	**388**	**568**	**891**	**466**	**444**
10-year average	**487**	**648**	***588**	**1,374**	**515**	**523**

Source: WDFW Data 2012.
* 7-year average for NF Toutle/Green.

Table 2.2.2.10: Wild summer steelhead population estimates for LCR populations from 2001 to 2011, current WDFW escapement goals, and LCSRP abundance targets.

Location	Kalama	EF Lewis	Washougal	Wind
WDFW Escapement Goal	**1,000**	**NA**	**NA**	**1,557**
LCSRP Abundance Target	**500**	**500**	**500**	**1,000**
2001	286	271	184	457
2002	454	440	404	680
2003	817	910	607	1,096
2004	632	425	NA	861
2005	400	673	608	587
2006	387	560	636	632
2007	361	412	681	737
2008	237	365	755	614
2009	308	800	433	580
2010	370	602	787	788
2011	534	1,084*	956*	1,468
3-year average	**404**	**829**	**725**	**945**
5-year average	**362**	**653**	**722**	**837**
10-year average	**450**	**627**	**652**	**804**

Source: WDFW Data 2012.
* Preliminary estimates.

Table 2.2.2.11: Population estimates of chum salmon in the Columbia River.

Location	2002	2003	2004	2005	2006	2007	2008	2009	2010[a]	2011[a]
Crazy Johnson Creek	---	---	966	1,471	3,639	759	1,034	981	677	2,374
WF Grays River	---	---	9,015	1,324	1,232	1,909	800	994	1,967	7,002
Mainstem Grays River	---	---	4,872	1,400	1,244	1,164	886	750	3,467	1,848
I-205 area	3,468	2,844	2,102	1,009	862	544	626	1,132	2,105	4,947
Multnomah area	1,267	1,130	665	211	313	115	28	102	427	641
St Cloud area	---	137	104	92	173	9	1	14	99	509
Horsetail area	---	---	106	40	63	17	33	6	45	183
Ives area[b]	4,466	1,942	363	263	387	145	168	141	214	162
Duncan Creek[c]	13	16	2	7	42	9	2	26	48	85
Hardy Creek	343	392	49	73	104	14	3	39	137	173
Hamilton Creek	1,000	500	222	174	246	79	114	115	247	517
Hamilton Spring Channel	794	363	346	84	236	44	109	91	187	324
Grays return[d]	12,041	16,974	15,157	4,327	6,232	3,966	2,807	2,833	6,399	11,518
I-205 to Bonneville return	11,351	7,324	3,959	1,953	2,426	976	1,084	1,666	3,509	7,541
Lower Columbia River Total	23,392	24,298	19,116	6,280	8,658	4,942	3,891	4,499	9,908	19,059

Source: Todd Hillson - WDFW Chum Program 2012

[a] Data for 2010 and 2011 is preliminary.

[b] Ives area counts are the carcass tagging estimate plus fish removed for broodstock, except for 2007 and 2008, which is area under the curve.

[c] Totals for Duncan Creek do not include broodstock brought in from mainstem spawning areas, adult trap catch or surveys below monitoring weirs only..

[d] Grays return totals include natural spawners and removed for broodstock.

- Provide the most recent 12 year (e.g. 1988-1999) estimates of annual proportions of direct hatchery-origin and listed natural-origin fish on natural spawning grounds, if known.

Not available for most species. See HGMP section 11.1 for planned M&E. The proportion of effective hatchery-origin spawners (pHOS) should be less than 30% of the naturally spawning population for this integrated program per HSRG guidelines (2004), as it is associated with a Primary natural population. See **Table 6.2.2** for the annually reported values.

2.2.3 <u>Describe hatchery activities, including associated monitoring and evaluation and research programs, that may lead to the take of NMFS listed fish in the target area, and provide estimated annual levels of take.</u>

- Describe hatchery activities that may lead to the take of listed salmonid populations in the target area, including how, where, and when the takes may occur, the risk potential for their occurrence, and the likely effects of the take.

Hatchery adult trapping, handling, holding, spawning, smolt release, smolt trapping, and other juvenile monitoring all involve a take potential to take listed wild winter-run and summer-run steelhead in the Kalama River. Details on the program are provided in HGMP section 11, and in Sharpe et al. (2000).

Broodstock Program:

Broodstock Collection: Winter-late endemic steelhead are trapped throughout the hatchery-origin broodstock capture period (January and February), though the wild fish abundance has not yet peaked at that time (peak wild adult return is typically in mid-April). Take is up to a maximum of 80 adult steelhead per year (see **Table 7.4.2.1**). Pre-spawn steelhead captured for use as broodstock will be held until ripe. Broodstock are either live-spawned and released downstream or lethally-spawned to allow more thorough pathogen-screening or accurate assessment of egg retention. Thus, the maximum lethal take of spawned adults is equal to the maximum number of broodstock (80 fish).

Genetic introgression: The expected gene flow rate can be much lower than the "stray" rate. In a well-run segregated program, the level of gene flow should be quite low for three reasons: 1) the numbers of hatchery-origin fish that have escaped harvest should be low compared to the number of natural-origin fish present; 2) the reproductive success of the hatchery-origin fish can be expected to be low (Leider et al. 1990; Kostow et al. 2003; McLean et al. 2003; McLean et al. 2004); and 3) spawning overlap may be low (Scott and Gill 2008).

WDFW initiated implementation of new monitoring efforts and changes to existing monitoring effort in 2008 for the purpose of collecting data/samples that would address the AHA modeling assumption validation needs (see HGMP section 1.16.1). Subsequent to implementation improvements to the monitoring program, WDFW began development of a study design to estimate actual gene flow/introgression. Genetic samples are collected from adult wild steelhead populations and naturally-produced steelhead smolts during summer steelhead monitoring, at winter steelhead trapping locations, during FIFO monitoring (smolts) and potentially during creel surveys. These samples and future sample collections may be valuable in assessing gene flow/introgression (see HGMP section 11).

Rearing Program:

Operation of Hatchery Facilities: Facility operation impacts include water withdrawal, effluent, and intake compliance. Effluent at outfall areas is rapidly diluted with mainstem flows and operation is within permitted NPDES guidelines (see HGMP sections 4.1 and 4.2). Indirect take from this operation is unknown.

Approximately 90,000 eggs per year will be taken for this program. Both intentional and unintentional take of up to 350 smolts can occur.

Disease: Over the years, rearing densities, disease prevention and fish health monitoring have greatly improved the health of the hatchery programs. *Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries*-Chapter 5 (IHOT 1995) have been instrumental in reducing disease outbreaks. Although pathogens occur in the wild and fish might be affected, they are believed to go undetected with predation quickly removing those fish.

In addition, although pathogens may cause post release mortality in fish from hatcheries, there is little evidence that hatchery origin fish routinely infect natural populations of salmon and steelhead in the Pacific Northwest (Enhancement Planning Team 1986 and Steward and Bjornn 1990). Prior to release, the hatchery population health and condition is established by the Area Fish Health Specialist. This is commonly done one to three weeks pre-release, and up to six weeks on systems with pathogen-free water and little or no history of disease. Indirect take from disease is unknown.

Release:

Hatchery Production/Density-Dependent Effects: Hatcheries can release numbers of fish that can exceed the density of the natural productivity in a limited area for a short period of time and can compete with listed fish. Hatchery fish are released as active smolts that will emigrate quickly from the system. In addition, fish are released from both hatchery sites over a period of ten days to two weeks in order to minimize density effects. This strategy allows groups to emigrate and move from the area daily. Indirect take from density dependent effects is unknown.

Potential Kalama Winter-late endemic steelhead program predation and competition effects on listed salmonids and eulachon: The proposed annual production goal for this program is 45,000 yearlings. Kalama endemic winter steelhead are released at 5.5 fpp (205 mm fl) in April/May (see HGMP section 10.3). Wild steelhead fry emerge from March through May; juveniles generally rear in fresh water for two years; emigration occurs from March to June, with peak migration from mid-April to mid-May (LCFRB Plan 2010). Due to size differences between listed yearling and sub-yearling smolts (**Table 2.2.3.1**), competition is unlikely, with different prey items and habitat preferences. The impact of Kalama program releases on natural-origin salmon and steelhead would be minimized because the release location is below the majority of all known spawning sites for these populations in the Kalama River.

Table 2.2.3.1: Peak migration timing and average fork length (mm) of out-migrant juvenile Chinook, coho and steelhead captured in rotary screw traps on Mill, Germany and Abernathy creek, Lower Columbia River, 2008.

Stream	Chinook		Coho		Steelhead	
	Avg Size (mm)	Peak Migration	Avg Size (mm)	Peak Migration	Avg Size (mm)	Peak Migration
Mill Cr	37.0	Mar 10-Apr 13	104.2	Mar 17-23	154.5	Apr 28-May 4
Germany Cr	39.8	Mar 17-23	115.3	May 19-25	177.8	May 12-18
Abernathy Cr	37.9	Mar 31 – Apr 6	112.1	May 19-25	163.8	May 12-18

Source: Kinsel et al 2009.

Both juvenile and adult salmonids have been documented to feed on eulachon (Gustafson et al. 2010). Predation of eulachon by steelhead reared in this program may occur, however it is unknown to what degree such predation may occur.

Residualism: To maximize smolting characteristics and minimize residualism, WDFW adheres to a combination of acclimation, volitional release strategies, size, and time guidelines.

- Condition factors, standard deviation and co-efficient of variation (CV) are measured throughout the rearing cycle and at release.
- Feeding rates and regimes throughout the rearing cycle are programmed to satiation feeding to minimize out-of-size fish and programmed to produce smolt size fish at date of release.
- Based on past history, fish have reached a size and condition that indicates a smolted condition at release.
- Releases occur within known time periods of species emigration from acclimated ponds.
- Releases from these ponds are volitional with large proportions of the populations moving out initially with the remainder of the population vacating within days or a few weeks.

Monitoring:

Associated monitoring Activities: Interaction between hatchery and wild adult salmonids will be managed by monitoring key tributary escapements of coho, steelhead, cutthroat and chum.

The following monitoring baseline activities are conducted in the Lower Columbia Management Area (LCMA) for adult steelhead and salmon: redd surveys are conducted for fall Chinook in the SF Toutle, Coweeman, EF Lewis and Washougal rivers. Redd surveys are also conducted in the Cowlitz River for fall and spring Chinook. Mark-recapture surveys provide data for summer steelhead populations in the Wind and Kalama rivers. Mark-recapture carcass surveys are conducted to estimate populations of Chinook salmon in Grays, Elochoman, Coweeman, SF Toutle, Green, Kalama, NF Lewis, EF Lewis, rivers and Skamokawa, Mill, Abernathy, and Germany creeks and for all chum salmon populations. Snorkel surveys are conducted for summer steelhead in the EF Lewis, Washougal Rivers. Trap counts are conducted on the Cowlitz, NF Toutle, Kalama, and Wind rivers and on Cedar Creek a tributary of the NF Lewis River. Area-Under-the-Curve (AUC) surveys are conducted to collect population data for chum salmon in Grays River and Hardy and Hamilton Creeks. All sampling of carcasses and trapped fish include recovery of coded wide tagged (CWT) fish for hatchery or wild stock evaluation. Downstream migrant trapping occurs on the Cowlitz, Kalama, NF Lewis, and Wind Rivers, Cedar Creek, and will expand to other basins as part of a salmonid life cycle monitoring program to estimate freshwater production and wild smolt to adult survival rates. Any take associated with monitoring activities is unknown but all follow scientific protocols designed to minimize impact.

- Provide information regarding past takes associated with the hatchery program, (if known) including numbers taken, and observed injury or mortality levels for listed fish.

Essentially all wild steelhead attempting to enter the upper Kalama watershed since 1998 are captured and handled over the course of normal hatchery operations and the associated research programs. Since both winter and summer-run steelhead are listed in the Kalama, the total take is thus the sum of the run sizes within a calendar year for each of the races, less fish that evade capture in the trap. Wild winter steelhead not used as broodstock are held for a short period to gather biological data, and returned to the river upstream of the fishway trap. Direct and immediate mortality on adult fish is low (<1%). Delayed mortality rates are not known, but are likely low since mortality of wild summer-run for broodstock and held for nearly one year is less than 10% (see also Kalama River Wild Summer Steelhead HGMP).

Table 2.2.3.2: Disposition of unmarked (no adipose fin-clip) wild winter steelhead returning to Kalama Falls Hatchery.

Brood Year	Mortality	Plants	Shipped	Surplus	Spawned[a]
2002	0	1,446	0	0	+38
2003	0	1,716	0	0	+40
2004	0	2,148	0	0	11+41
2005	0	1,822	0	0	+59
2006	0	1,525	0	0	+81
2007	0	906	0	0	+62
2008	0	682	0	0	2+65
2009	0	582	0	0	+62
2010	0	876	0	0	+48
2011	0	593	0	0	+76
2012	10	979	0	0	+69
2013	1	769	0	0	+78

Source: WDFW Annual Escapement Reports.
"+" = live spawned
[a] Live spawned fish may be released.

- Provide projected annual take levels for listed fish by life stage (juvenile and adult) quantified (to the extent feasible) by the type of take resulting from the hatchery program (e.g. capture, handling, tagging, injury, or lethal take).

See "take" tables at the end of this HGMP.

- Indicate contingency plans for addressing situations where take levels within a given year have exceeded, or are projected to exceed, take levels described in this plan for the program.

For other listed species, if significant numbers of wild salmonids are observed impacted by this operation, then staff would inform the WDFW District Biologist, Fish Health Specialist or Area Habitat Biologist who, along with the Hatchery Complex Manager, would determine an appropriate plan and consult with NOAA-NMFS for adaptive management review and protocols.

No situations are expected to occur where take would exceed ESA limits. If significant numbers of wild salmonids are observed impacted by this operation, then staff would inform the WDFW District Biologist, Fish Health Specialist or Area Habitat Biologist who, along with the Hatchery Complex Manager, would determine an appropriate plan and consult with NOAA-NMFS for adaptive management review and protocols.

Handling and release of wild steelhead in broodstock trapping operations is monitored and take observations have been rare. Any additionally mortality from this operation on a yearly basis would be communicated to Fish Program staff for additional guidance.

3 SECTION 3. RELATIONSHIP OF PROGRAM TO OTHER MANAGEMENT OBJECTIVES

3.1 Describe alignment of the hatchery program with any ESU-wide hatchery plan (e.g. Hood Canal Summer Chum Conservation Initiative) or other regionally accepted policies (e.g. the NPPC Annual Production Review Report and Recommendations - NPPC document 99-15). Explain any proposed deviations from the plan or policies.

WDFW has several policies/plans that help inform management decisions regarding the HGMPs currently under review. These policies include:

1. Hatchery and Fishery Reform Policy (Commission Policy C3619)
2. The Conservation and Sustainable Fisheries Plan (draft)
3. The Hatchery Action Implementation Plans (HAIP)
4. Lower Columbia Salmon Recovery Plan (LCSRP)

Descriptions of these policies and excerpts are shown below:

Policies/Plans – Key Excerpts

Hatchery and Fishery Reform Policy: Washington Department of Fish and Wildlife Commission Policy C-3619. WDFW adopted the Hatchery and Fishery Reform Policy C-3619 in 2009. Its purpose is to advance the conservation and recovery of wild salmon and steelhead by promoting and guiding the implementation of hatchery reform. The intent of hatchery reform is to improve hatchery effectiveness, ensure compatibility between hatchery production and salmon recovery plans and rebuilding programs, and support sustainable fisheries. WDFW Policy C-3619 works to promote the conservation and recovery of wild salmon and steelhead and provide fishery-related benefits by establishing clear goals for each state hatchery, conducting scientifically defensible-operations, and using informed decision making to improve management. It is recognized that many state operated hatcheries are subject to provisions under *U.S. v Washington* (1974) and *U.S. v Oregon* and that hatchery reform actions must be done in close coordination with tribal co-managers. Washington Fish and Wildlife Commission Policy: POL-C3619.

Guidelines from the policy include:

1. Use the principles, standards, and recommendations of the Hatchery Scientific Review Group (HSRG) to guide the management of hatcheries operated by the Department.
2. Develop watershed-specific action plans that systematically implement hatchery reform as part of a comprehensive, integrated (All-H) strategy for meeting conservation and harvest goals at the watershed and Evolutionarily Significant Unit (ESU)/Distinct Population Segment (DPS) levels. Action Plans will include development of stock (watershed) specific population designations and application of HSRG broodstock management standards.

Conservation and Sustainable Fisheries Plan (*CSFP*)*:* The CSFP is a draft plan that has been developed to meet WDFW's responsibilities outlined in the Lower Columbia Salmon Recovery Plan (LCSRP) and address the HSRG suggested solutions and achieve HRSG standards for primary, contributing and stabilizing populations. The plan describes the implementation of changes to hatchery and harvest programs and how they assist in recovery and achieve HSRG guidelines. The draft plan also identifies Viable Salmonid Population (VSP) parameters that will be addressed.

Hatchery Action Implementation Plans (*HAIP*)*:* The HAIPs illustrate how WDFW is implementing hatchery programs to incorporate the HSRG guidelines. The plans provide the current programs and explain the future goals.

Lower Columbia Salmon Recovery Plan (*LCSRP*)*:* Some sub-basins will be free of hatchery influence and hatchery programs. In other sub-basins, hatchery programs will serve specific conservation and harvest purposes consistent with goals for naturally-spawning populations. The mosaic of programs is designed to ensure that overall each DPS will be naturally self-sustaining.

Strategies:

1. Reconfigure production-based hatchery programs to minimize impacts on natural populations and complement recovery objectives.
2. Adaptively manage hatcheries to respond to future knowledge, enhance natural production, and improve operational efficiencies.

Mitchell Act: This program receives Mitchell Act Funding. Initially passed in 1938, the Mitchell Act is intended to help rebuild and conserve the fish runs, and mitigate the impacts to fish from water diversions, dams on the mainstem of the Columbia River, pollution and logging. The Mitchell Act specifically directs establishment of salmon hatcheries, conduct of engineering and biological surveys and experiments, and installing fish protective devices. It also authorizes agreements with State fishery agencies and construction of facilities on State-owned lands. NMFS has administered the program as of 1970. There are 15 Mitchell Act hatcheries in Washington State; the majority of which are below Bonneville Dam.

The Mitchell Act programs are intended to support Northwest fishing economies – particularly coastal and Native American -- that have relied on Columbia River production both before and after dam construction. Catches of hatchery fish sustain the economies of local communities while keeping incidental mortalities of ESA-Listed fish at approved levels. Value of hatchery production and benefit to local economies will be further increased by implementing fisheries that increase harvest of hatchery produced fish, as expected through implementation of the LCSRP.

3.2 List all existing cooperative agreements, memoranda of understanding, memoranda of agreement, or other management plans or court orders under which program operates.

Future Brood Document. Hatchery salmon and steelhead production levels are detailed in the annual Future Brood Document, a pre-season planning document for fish hatchery production in Washington State for the upcoming brood stock collection and fish rearing season (July 1 – June 30).

See also HGMP section 3.1.

3.3 Relationship to harvest objectives.

Total annual harvest is dependent on management response to annual abundance in Pacific Salmon Commission (PSC - U.S./Canada), Pacific Fishery Management Council (PFMC - U.S. ocean), and Columbia River Compact forums. WDFW also has received authorization for tributary, Columbia River mainstem, and ocean fisheries; the combined harvest rates in the *Fisheries Management and Evaluation Plan* (FMEP), *Columbia River Fish Management Plan* (CRFMP), and ocean fisheries are reviewed annually in the North of Falcon process.

3.3.1 <u>Describe fisheries benefitting from the program, and indicate harvest levels and rates for program-origin fish for the last twelve years (1988-99), if available.</u>

Under permanent regulations, the mainstem Columbia River is open to the retention of hatchery steelhead beginning May 16 from the Tongue Point/Rocky Point line upstream to the I-5 Bridge and June 16 from the I-5 Bridge upstream to the Oregon/Washington border above McNary Dam.

The steelhead fishery is closed under permanent regulations during April 1–May 15 between Tongue Point and the I-5 Bridge and April 1–June 15 upstream of I-5, when spring Chinook abundance is high.

Table 3.3.1.1: Kalama River winter Steelhead Harvest[a], based on WDFW Catch Record Card (CRC) data for brood years 2001-2009 (released 2002-2010).

Return Year	Total Released[b]	Sport Harvest[c]	Hatchery Escapement	SAR %
2003/2004	83,382	693	3,903	5.51
2004/2005	76,886	642	1,582	2.89
2005/2006	77,964	421	1,259	2.15
2006/2007	73,352	661	1,436	2.86
2007/2008	79,277	521	998	1.92
2008/2009	104,753	1,228	1,388	2.50
2009/2010	76,103	1,662	1,724	4.45
2010/2011	115,344	954	879	1.59
2011/2012[d]	99,634	964	950	1.92
Average	**87,411**	**861**	**1,569**	**2.87**

[a] Assumes three year old adults and cannot determine repeat spawners; includes winter and winter-late stocks.

[b] Includes all winter steelhead releases within the Kalama River watershed.

[c] Freshwater Sport based on WDFW Catch Record Card (CRC) data for BYs 1983-2008. Based on harvest from the Kalama River system; does not include marine or mainstem Columbia River catch.

[d] Preliminary data; represents a minimum estimate of survival.

3.4 Relationship to habitat protection and recovery strategies.

The following processes have included habitat identification problems, priority fixes and evolved as key components to *The Lower Columbia Salmon Recovery and Fish and Wildlife Sub-basin Plans* (Volume 1; Clark, Cowlitz, Lewis, Skamania and Wahkiakum Counties, December 15, 2004).

Sub-Basin Planning - Regional sub-basin planning processes include the *Cowlitz River Sub-basin Salmon and Steelhead Production Plan*, September 1, 1990 with a more recent Draft Cowlitz River Sub-basin Summary (May 17, 2002) was prepared for the Northwest Power Planning Council. The Sub-basin efforts provided initial building blocks for the LCFRB regional recovery plan. The Lower Columbia fish Recovery Board (LCFRB) has adopted the *Lower Columbia Salmon Recovery and Fish and Wildlife Sub-basin Plans* (Volume 1; Clark, Cowlitz, Lewis, Skamania and Wahkiakum Counties, December 15, 2004) with the understanding that Implementation of the schedule and actions for local jurisdictions depends upon funding and other resources.

Habitat Treatment and Protection - Ecosystem Diagnosis and Treatment (EDT) compares habitat today to that of the basin in a historically unmodified state. EDT has been modeled for productivity in the Cowlitz basin in The Lower Columbia Salmon Recovery and Fish and Wildlife Sub-basin Plans and has been used by Tacoma Power for the FERC re-licensing agreements for the upper basin productivity goals. WDFW is also conducting a Salmon Steelhead Habitat Inventory Assessment Program (SSHIAP), which documents barriers to fish passage. WDFW's habitat program issues hydraulic permits for construction or modifications to streams and wetlands. This provides habitat protection to riparian areas and actual watercourses within the watershed.

Limiting Factors Analysis (LFA) - A WRIA 26 LFA was conducted by the Washington State Conservation Commission (May 2002). WRIA 26 was separated into seven sub-basins; Coweeman, lower Cowlitz, Toutle, Mayfield/Tilton, Riffe Lake, Cispus, and upper Cowlitz.

3.5 Ecological interactions.

(1) *Salmonid and non-salmonid fishes or species that could negatively impact the program:* Out-migrant hatchery fish can be preyed upon through the entire migration corridor from the river sub-basin to the mainstem Columbia River and estuary. Northern pikeminnows and introduced spiny rays, as well as avian predators, including gulls, mergansers, cormorants, belted kingfishers, great blue herons and night herons in the Columbia mainstem sloughs, can prey on steelhead smolts. Mammals that can take a heavy toll on migrating smolts and returning adults include: harbor seals, sea lions, river otters and orcas

(2) *Salmonid and non-salmonid fishes or species that could be negatively impacted by the program:* Co-occurring natural salmon and steelhead populations in local tributary areas and the Columbia River mainstem corridor areas could be negatively impacted by program fish. Of primary concern are the ESA listed endangered and threatened salmonids: Snake River fall-run Chinook salmon ESU (threatened); Snake River spring/summer-run Chinook salmon ESU (threatened); Lower Columbia River Chinook salmon ESU (threatened); Upper Columbia River spring-run Chinook salmon ESU (endangered); Columbia River chum salmon ESU (threatened); Snake River sockeye salmon ESU (endangered); Upper Columbia River steelhead ESU (endangered); Snake River Basin steelhead ESU (threatened); Lower Columbia River steelhead ESU (threatened); Middle Columbia River steelhead ESU (threatened); and the Columbia River distinct population segment of bull trout (threatened). Listed fish can be impacted through a complex web of short and long term processes and over multiple time periods which makes evaluation of this a net effect difficult. WDFW is unaware of studies directly evaluating adverse ecological effects to listed salmon. In addition the program may have unknown impacts on eulachon populations in the basin.

(3) *Salmonid and non-salmonid fishes or other species that could positively impact the program.* Multiple programs including fall Chinook, coho and steelhead programs are released from the Kalama Hatchery and limited natural production of Chinook, coho, chum and steelhead occurs in this system along with non-salmonid fishes (sculpins, lampreys and sucker etc.).

(4) *Salmonid and non-salmonid fishes or species that could be positively impacted by the program.* Steelhead smolts can be preyed upon release thru the entire migration corridor from the river sub-basin to the mainstem Columbia River and estuary. Northern pikeminnows and introduced spiny rays in the Columbia mainstem sloughs can prey on steelhead smolts as well as avian predators, including gulls, mergansers, cormorants, belted kingfishers, great blue herons and night herons. Mammals that benefit from migrating smolts and returning adults include: harbor seals, sea lions, river otters and orcas. Except for yearling coho and steelhead, these species may serve as prey items during the emigration through the basin. Hatchery fish provide an additional food source to natural predators that might otherwise consume listed fish and may overwhelm established predators providing a beneficial, protective effect to co-occurring wild fish. Hatchery releases can also behaviorally encourage mass emigration of multiple species through the watershed, reducing residency. Many watersheds in the Pacific Northwest appear to be nutrient-limited (Gregory et al. 1987; Kline et al. 1997) and salmonid carcasses can be an important source of marine derived nutrients (Levy 1997). Carcasses from returning adult salmonids have been found to elevate stream productivity through several pathways, including:

a) the releases of nutrients from decaying carcasses has been observed to stimulate primary productivity (Wipfli et al. 1998);
b) the decaying carcasses have been found to enrich the food base of aquatic invertebrates (Mathisen et al. 1988); and

c) Juvenile salmonids have been observed to feed directly on carcasses (Bilby et al. 1996).

4 SECTION 4. WATER SOURCE

4.1 Provide a quantitative and narrative description of the water source (spring, well, surface), water quality profile, and natural limitations to production attributable to the water source.

Table 4.1.1: Water sources for the Kalama Hatchery Complex.

Facility	Water Source	Water Right		Available Water Flow	Avg Water Temp. (°F)	Usage	Limitations
		Record/Cert. No	Permit No.				
Kalama Falls	Kalama River (surface) pump	S2-CV2P641/ VOL2P535	-----	265 cfs	43-51	Adult holding, incubation and rearing	Temps in lower river can reach the 70s in the summer
	Unnamed creek (surface) gravity intake	S2-*18989CWRIS/ 09625	14224	3 cfs		Incubation and rearing	No rearing during summer months due to temps and low water.
	Unnamed creek (surface) gravity intake	S2-*18990CWRIS/ 09624	14225	2 cfs			
Fallert Creek	Fallert Creek (surface) gravity intake	S2-21721C WRIS	-----	13 cfs	38-53	Adult holding, incubation and rearing	Limited water during summer months due to low flows. Temps in lower river can reach the 70s in the summer.
	Fallert Creek (surface) gravity intake	S2-25509C WRIS	-----	12 cfs	38-53		
Mossy-rock	Unnamed Spring	S2-*05156CWRIS (or S2-CV2P675)/ 02137	03131	3.5 cfs	50	Incubation, rearing	Dependent on rainfall, weather and agricultural use of aquifer.
Gobar Pond	Gobar Creek (surface) gravity intake	S2-23782C WRIS	-----	7 cfs	43-51	Rearing, acclimation	No rearing during summer months due to temps and low water.

Source: Phinney 2006, WDOE Water Resources Explorer 2014, WDFW hatchery data.
Note: S2-CV2P641 at Kalama Falls Hatchery covers a diversion of 8.75 cfs to Fallert Creek Hatchery.

Kalama Falls Hatchery. In the fall/winter of 2000/2001, a new intake pump station was constructed with FEMA monies after the 1996 flood damaged the facility. Five new pumps were installed capable of delivering approximately 16 cfs for rearing while two incubation pumps deliver 4 cfs. In 2010 a sixth pump rated at 3.2 cfs was added to the intake station increasing water pumping capacity to 19.2 cfs. A settling pond for incubation water was completed in 2002. Additionally, there are two surface water gravity intakes on un-named creeks – one near the hatchery and one on the other side of the river and because of steep gradients have been determined by WDFW to be non-fish bearing.

Water rights are formalized through the Washington Department of Ecology, and were obtained in 1953 and 1965.

Fallert Creek Hatchery. The intake structure on Fallert Creek, located at RKm 0.8 (RM 0.5), provides gravity-fed water up to 25 cfs (11,250 gpm) depending on weather and stream conditions. Pumps need to be used when dewatering becomes a concern in late-summer/early-fall; the Kalama River intake is located adjacent to the hatchery with a four-chambered 20-H.P. electric pump system which can provide up to 8.7cfs river water (covered under S2-CV2P641 at Kalama Falls). Reuse is available from the earthen pond to the asphalt pond.

Water rights are formalized through the Washington Department of Ecology, and were obtained in 1973 and 1980.

Mossyrock Trout Hatchery. Spring water supplies the hatchery with 800-2,000 gpm depending on rainfall, weather, and agricultural use of the aquifer (Ashbrook and Fuss 1997). Water rights are formalized through the Washington Department of Ecology, and were obtained by the City of Tacoma in 1940; WDFW purchased the water rights from the City of Tacoma.

Gobar Creek Acclimation and Release Pond uses water from an intake on Gobar Creek. Water is carried approximately 1,000 ft via an 18-inch aluminum culvert and is gravity-fed. The intake is engineered to maintain a sufficient head for water flow. The water right is formalized through the Washington Department of Ecology, and was obtained by Weyerhaeuser Timber Co. in 1975. Approximately 7 cfs is available for use. Gobar Pond is operated thru an MOA with Weyerhaeuser Corporation and meets NPDES limits

NPDES Permits:
These facilities operate under the "*Upland Fin-Fish Hatching and Rearing*" *National Pollution Discharge Elimination System* (NPDES) general permit which conducts effluent monitoring and reporting and operates within the limitations established in its permit administered by the Washington Department of Ecology (DOE).

Discharges from the cleaning treatment system are monitored as follows:

- *Total Suspended Solids* (*TSS*) 1 to 2 times per month on composite effluent, maximum effluent and influent samples.
- *Settleable Solids* (*SS*) 1 to 2 times per week on effluent and influent samples.
- *In-hatchery Water Temperature* - daily maximum and minimum readings.

Table 4.1.2: Record of NPDES permit compliance.

Facility/ Permit #	Reports Submitted Y/N			Last Inspection Date	Violations Last 5 yrs (see Table 4.1.3)	Corrective Actions Y/N	Meets Compliance Y/N
	Monthly	Qtrly	Annual				
Kalama Falls WAG13-1039	Y	Y	Y	5/2/2006	3	N	Y
Fallert Creek WAG13-1053	Y	Y	Y	5/2/2006	1	N	Y
Mossyrock WAG13-1013	Y	Y	Y	5/31/2012	0	N	Y

Source: Ann West, WDFW Hatcheries Headquarters Database 2013.

Table 4.1.3: List of NPDES violations over the last five years (2008-2012).

Facility	Month/ Year	Parameter	Sample Type	Result/ Violation	Permit Limit	Comment	Action
KFH	Dec 2010	TSS	Avg Net Composite	6.87 mg/L	5.0 mg/L	High water event.	NA
	Jun 2011	TSS	Drawdown Max Grab	155.4 mg/L	100.0 mg/L	Late sampling and pond half cleaned.	Staff increased
	Feb 2012	TSS	Max Net Grab	23.8 mg/ L	15.0 mg/L	High river flows	NA
Fallert Cr	Aug 2010	TSS	Avg Net Composite	7.5 mg/L	5.0 mg/L	High river flow and heavy rains.	NA

Source: Ann West, WDFW Hatcheries Headquarters Database 2013

Note: These violations did not result in non-compliance with NPDES permit.

4.2 Indicate risk aversion measures that will be applied to minimize the likelihood for the take of listed natural fish as a result of hatchery water withdrawal, screening, or effluent discharge.

Kalama Falls Hatchery. The intake was rebuilt in 2001, and is in compliance.

Fallert Creek. The intake screens are in compliance with state and federal guidelines (NMFS 1995, 1996), but do not meet the current *Anadromous Salmonid Passage Facility Design* criteria (NMFS 2011). WDFW is in the process of designing a new river intake system to meet NOAA-NMFS compliance (Mitchell Act Intake and Fish Passage Study Report 2003) and has included it in the 2013-2015 Capital Budget Request. A feasibility study was funded using Pacific Coast Salmon Recovery Funds in 2011 and completed in 2012.

Gobar Pond. Intake is designed to allow for overflow for downstream fish passage and debris transport, and upstream fish passage. It is unknown if this intake is in compliance with current standards.

5 SECTION 5. FACILITIES

5.1 Broodstock collection facilities (or methods).

Kalama Falls Hatchery. A trap operates 365 days a year at the Kalama Falls Hatchery. Fish volitionally enter the trap via a step and pool ladder at Kalama Falls Hatchery. Adults are transferred from the trap via overhead brail into a 1,500 gallon tanker truck, and moved to the sorting pond (see HGMP section 5.3).

The Modrow trap, located on the Kalama River at RKm 4.8, does not operate during the steelhead broodstock collection period.

5.2 Fish transportation equipment (description of pen, tank truck, or container used).

Table 5.2.1: Transportation equipment available for Kalama endemic winter steelhead program.

Equipment Type	Capacity (gallons)	Supp. Oxygen (y/n)	Temp. Control (y/n)	Norm. Transit Time (minutes)	Chemical(s) Used	Dosage (ppm)
Tanker Truck (Kalama Complex)	1,500	Y	N	20	Sodium chloride (Salt)	5,000 ppm (~0.5%)
Tanker Truck (Mossyrock)	750	Y	N	90	Sodium chloride (Salt)	5,000 ppm (~0.5%)

Eyed-eggs are transported from Kalama Falls Hatchery to either Fallert Creek or Mossyrock hatcheries via a pickup truck in a large cooler.

Sub-yearlings (12 fpp) are transferred from Mossyrock Hatchery to Kalama Falls Hatchery via tanker truck in December. Transport time is approximately 90 minutes.

Yearlings (8 fpp) are transported from Kalama Falls Hatchery to Gobar Pond in the tanker truck in March. Transport time is approximately 30 minutes. Yearlings may also be transferred from Mossyrock Hatchery to Gobar Pond in March; transport time is approximately 120 minutes.

5.3 Broodstock holding and spawning facilities.

Table 5.3.1: Holding facilities available, Kalama Falls Hatchery.

Ponds (No.)	Pond Type	Volume (cu. ft.)	Length (ft.)	Width (ft.)	Depth (ft.)	Flow (gpm)	Max. Flow Index	Max. Density Index
1	Concrete adult sorting pond	3,000	60	10	5	500	1.61	0.20

Adults are transferred from the trap via overhead brail into a 1,500 gallon tanker truck, and hauled a short distance (150 m) to the concrete raceway used as a sorting pond. Fish are immediately sorted and unmarked fish (natural-origin) surplus to broodstock needs are passed upstream. Adults selected for broodstock are moved to the in the 60'x40'x5' adult holding pond (see **Table 5.5.1**). Adults are held for up to five weeks before spawning, and are collected when ripe over the curve of the run. The flow through the ponds is 400 gpm and water temperatures range from 41° to 55°F during holding.

5.4 Incubation facilities.

Table 5.4.1: Incubation vessels available for Kalama endemic winter steelhead program.

Facility	Type	Units (number)	Size	Flow (gpm)	Volume (cu. ft.)	Loading (eggs/unit)
KFH	Vertical Stack Tray Units (14 trays/stack)	84 1176 trays	24" x 25' 'x 4"	5	0.55/tray	n/a
	Free-style eyeing unit	15	41" x 15" x 21"	20	7.48/unit	300,000
Fallert Cr	Vertical Stack Tray Units (14 trays/stack)	28	24" x 25' 'x 4"	5	0.55/tray	n/a
	Fiberglass Intermediate Deep Troughs	4	16' x 2.8' x 24"	15	91	4,500
	Shallow Troughs	16	15' x 1' x 8"		10	n/a
Mossyrock	Shallow Battery Troughs	48 upper 48 lower	15' x 1' x 8"	10	8	20,000

Kalama Falls Hatchery. Fertilized eggs are placed in vertical incubators supplied with pathogen-free creek water.

Fallert Creek Hatchery. Eyed-eggs are transferred from Kalama Falls Hatchery and incubated in vertical trays until ponding into the intermediates.

Mossyrock Hatchery. Eyed-eggs transferred from Kalama Falls Hatchery are reared in the shallow battery troughs, supplied with spring water.

5.5 Rearing facilities.

Table 5.5.1: Rearing facilities available for Kalama endemic winter steelhead program.

Facility	Ponds (No.)	Pond Type	Volume (cu.ft)	Length (ft.)	Width (ft.)	Depth (ft.)	Flow (gpm)	Max. Density Index
Mossyrock	4	Small Raceways	240	30	4	2	60	1.61
	12	Large Raceways	1,800	90	10	2	200	1.61
KFH	12	Standard Concrete Raceways	4,800	80	20	3	600	1.61
	6	Rearing/Adults Ponds	10,800	60	40	5	800	1.61
	4	Fiberglass Intermediate Deep Troughs	91	16	2.8	2	20	1.61

Fallert Creek Hatchery. Fry are ponded into the intermediate troughs (see HGMP section 5.4) until transfer back to Kalama Falls Hatchery.

Mossyrock Hatchery. Fry are ponded into two raceways in August/September. Fish are reared on spring water until they reach ~12 fpp, and transferred to Kalama Falls Hatchery or directly to Gobar Pond in early March.

Kalama Falls Hatchery. Sub-yearlings (12 fpp) are transferred to standard concrete raceways at Kalama Falls Hatchery in December, before transfer to Gobar Pond in March at 8 fpp for acclimation and release. Up to four standard raceways can be used for rearing.

5.6 Acclimation/release facilities.

Table 5.6.1: Acclimation facilities available, Gobar Pond.

Ponds (No.)	Pond Type	Volume (cu. ft.)	Length (ft.)	Width (ft.)	Depth (ft.)	Flow (gpm)	Max. Density Index
1	Acclimation Pond	430,000	426.4	95	7.4	2,600	0.5

Fish acclimated and released from Gobar Ponds. Water temperatures are around 44-45°F.

5.7 Describe operational difficulties or disasters that led to significant fish mortality.

Problems with IHNV, *Ichthyophthirius*, and Bacterial Coldwater Disease (BCD) have been the major contributors to rearing mortality at the Kalama Hatchery Complex (see **Table 9.2.1.1**). In an effort to increase survival rates, all IHNV-negative stock have been reared at Mossyrock Hatchery since brood year 2011, to take advantage of the pathogen-free water.

Avian predation on juveniles can be a problem, however, there are no reliable estimates of the degree of loss attributed to avian predation. There has been some otter predation at Gobar Pond and Mossyrock Hatchery.

The flood event in November 2006 is suspected of introducing a source of IHNV infection to Kalama Falls Hatchery.

Winter storm damage in 2010 caused one of two pathogen-free water sources to be unavailable at Kalama Falls Hatchery. A tree fell and damaged the supply line, resulting in a water shortage in late-spring; river water had to be used to supplement flows. Only an issue for the winter-early (hatchery) steelhead were affected; 52,000 winter-late steelhead were transferred to Mossyrock and the remainder were reared at Fallert. The fish that remained at Fallert experienced high mortality, due to BCWD and *Ich*.

5.8 Indicate available back-up systems, and risk aversion measures that will be applied, that minimize the likelihood for the take of listed natural fish that may result from equipment failure, water loss, flooding, disease transmission, or other events that could lead to injury or mortality.

- All pumps, broodstock holding, incubation and rearing receptacles have water loss alarms.
- Staff is available 24/7 to respond to pump failure, water loss, and flooding events.
- Aeration pumps are used to maximize the water conditions in the adult collection pond during periods of low water quality which benefits fish held until sorting can be accomplished.
- Fish health protocols through broodstock collection, incubation and rearing phases are followed and monitored monthly.
- Broodstock collection is checked daily for program and listed fish.
- Staff monitors the trap operation daily to keep the numbers of fish stacking in the trap area to manageable volumes. Heavy volumes can create density problems for listed fish if they are not removed expeditiously.

6 SECTION 6. BROODSTOCK ORIGIN AND IDENTITY

Describe the origin and identity of broodstock used in the program, its ESA-listing status, annual collection goals, and relationship to wild fish of the same species/population.

6.1 Source.

Broodstock is collected from unmarked hatchery fish returning to the Kalama Falls Hatchery trap/weir (100% collection rate at structure).

6.2 Supporting information.

6.2.1 History.

Wild Kalama winter-run steelhead are indigenous to the basin and were present before annual stocking of winter-early (Beaver Creek/Elochoman Hatchery stock) steelhead began in the late-1950s. The wild escapement goal for the basin is 1,000 spawners. Broodstock for this program was first collected in 1998 as part of a research project (Sharpe et al. 2000). Kalama winter-late endemic steelhead are collected at the Kalama Falls Hatchery trap (RM 10) via volunteers that are recruited through the Kalama River. No hatchery-origin steelhead are used as broodstock. Peak time of spawning for wild winter fish is late-February to early-May. Fish are spawned in mid-April.

Monitoring smolt-to-adult returns and natural reproductive performance was expected to continue for several more years. In 2003, the barrier created by Kalama Falls was damaged and compromised the study. The program continues as an integrated broodstock in response to the HSRG recommendations (2004).

6.2.2 Annual size.

Up to 80 adults (30% of the run) are collected to achieve an egg-take goal of 90,000 (FBD 2014).

6.2.3 Past and proposed level of natural fish in broodstock.

Wild winter-run have never before been incorporated into the hatchery programs' smolt releases in the basin prior to initiation of this program in 1998 (pers. comm. Pat Hulett, 2014). This program is comprised entirely of wild broodstock.

PNI should be >0.67 (pNOB >10%, and pHOS <30%).

Wild winter steelhead not used as broodstock are held for a short period to gather biological data, and returned to the river upstream of the fishway trap.

6.2.4 Genetic or ecological differences.

Adults: Indigenous winter-late steelhead are genetically and behaviorally distinct from both the hatchery winter and summer steelhead traditionally stocked in the target basin (Kalama River) as judged by allozyme methods, run timing and spawn timing (Sharpe et al. 2000). Hatchery winter (early) steelhead are Beaver Creek/Elochoman stock derivatives (LCFRB Recovery Plan, 2010).

Smolts: This program was initiated in 1998 using only natural-origin (unmarked) winter-late steelhead, so they should be similar to the natural-origin winter-late steelhead. However, program fish are released as one-year smolts, where natural-origin juveniles emigrate generally as two-year smolts.

6.2.5 Reasons for choosing.

Indigenous stock with Kalama Falls Hatchery and the lower falls providing logistical and research support and the segregation ability to conduct research for this program.

6.3 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish that may occur as a result of broodstock selection practices.

- Program fish are mass-marked (adipose fin-clipped).
- Holding pond procedures follow IHOT guidelines.
- Other listed fish encountered during the broodstock collection process will be returned directly to the river or passed into the upper watershed, with minimal handling and holding time.

- Any observed mortalities will be reported in the WDFW Hatcheries Headquarters Database.

Take of listed steelhead for use in this program can lead to mortality of hatchery and wild fish collected at trapping sites. Collection methods may affect the movement, spawning activities, or migrational timing of natural spawners; however, these effects are minor as hatchery rearing insures that progeny survive at a much higher rate than if the captured fish had been allowed to spawn in the wild. This is an experimental research program with adaptive management, with a long history of collection protocols and long monitoring.

7 SECTION 7. BROODSTOCK COLLECTION

7.1 Life-history stage to be collected (adults, eggs, or juveniles).

Wild adult winter steelhead returning to the Kalama River.

7.2 Collection or sampling design.

Kalama Falls Hatchery. A trap operates 365 days a year at the Kalama Falls Hatchery. A human-modified waterfalls acts as a near-complete passage barrier at RKm 16.1 diverting nearly all upstream migrants to the trap. Fish volitionally enter the trap via a step and pool ladder. Winter-late steelhead are trapped throughout the hatchery-origin broodstock capture period, although the wild adult return typically peaks in mid-April. Fish are taken near the peak time of spawning, based on historical run timing records, to avoid selectively altering that character in the population. The trapping program time period may be adjusted based upon actual observed run timing. WDFW staff inspect and maintain the trap on a daily basis.

All fish captured in the trap are transported by truck to the sorting pond, approximately 150 m from the trap. Prior to sampling, all fish are anesthetized with carbon dioxide or electro-narcosis (EN). Biological data collected includes sex, size (fork length), DNA tissue samples (~75 mm^2 from caudal fin), and scale samples. The fish are allowed to recover from the anesthesia before being returned to the river.

Adults selected for broodstock are held in the adult holding pond for up to five weeks, until ripe. Fish may be live-spawned (see HGMP section 8.3); surviving adults are returned to the river to allow for the potential for repeat spawning in subsequent years. Mortalities are examined to ascertain cause of death.

Wild winter steelhead not used as broodstock are held for a short period to gather biological data, and returned to the river upstream of the fishway trap.

7.3 Identity.

Broodstock are collected from natural-origin fish only. Origin was established by the presence of an adipose fin (adipose fin intact) and absence of a stubbed dorsal fin; most hatchery-origin steelhead returning to the Kalama have no adipose fin and a markedly-eroded dorsal fin (Sharpe et al. 2010).

7.4 Proposed number to be collected:

7.4.1 <u>Program goal (assuming 1:1 sex ratio for adults):</u>

See HGMP section 6.2.2.

7.4.2 Broodstock collection levels for the last twelve years, or for most recent years available:

Table 7.4.2.1: Broodstock collection levels, Kalama River endemic winter steelhead.

Brood Year	Egg-Take	Females	Males
2002	81,117	18	22
2003	98,510	20	20
2004	113,635	26	26
2005	102,136	25	34
2006	103,514	33	48
2007	98,670	24	43
2008	102,782	24	44
2009	98,703	23	39
2010	92,163	25	23
2011	93,752	24	53
2012	97,781	23	46
2013	112,543	26	52

Source: WDFW hatchery records.

7.5 Disposition of hatchery-origin fish collected in surplus of broodstock needs.

Wild/hatchery winter-late F1 progeny (adults from natural-origin parents released from this program as yearlings) returning to the hatchery are recycled into the lower river fishery for additional harvest opportunity, or planted into Kress Lake, a small land-locked lake in the lower Kalama basin. Some late-arriving ripe fish are sacrificed for viral sampling.

No hatchery-origin winter-run steelhead are intentionally passed into the upper watershed. This was done to provide additional sport harvest opportunity in the lower river, while preventing the passage of hatchery adults into the primary natural- spawning areas above Kalama Falls. These protocols have been in place since 1997.

7.6 Fish transportation and holding methods.

Adults are transported from the hatchery trap via overhead brail into a 1,500 gallon tanker truck, and moved 150 m to the raceways used as a sorting pond (see HGMP section 5.1). Natural-origin winter-late steelhead are held for a short period (0-3 days). Sorting is conducted under anesthesia, during which biological data is gathered (see HGMP section 7.2). After sorting, adults selected for broodstock are held in the adult sorting pond until ready to spawn. Unmarked natural-origin adults in surplus to broodstock and research needs are passed upstream; no hatchery-origin winter-late steelhead are intentionally passed upstream.

7.7 Describe fish health maintenance and sanitation procedures applied.

WDFW facilities follow Integrated Hatchery Operations Team (IHOT), Pacific Northwest Fish Health Protection Committee (PNFHPC), WDFW’s Fish Health Manual (November 1966, updated March 1998, revised March 2010) or tribal guidelines. Fish Health Specialists make monthly visits and consult with staff. The adult holding area is separated from all other hatchery operations. Disinfection procedures that prevent pathogen transmission between stocks of fish are implemented during spawning. Spawning implements are rinsed with an iodophor solution, and spawning area and implements are disinfected with iodophor solution at the end of spawning.

7.8 Disposition of carcasses.

All adults are live-spawned; mortalities are taken to a landfill.

7.9 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish resulting from the broodstock collection program.

- Fish are collected over the historical curve of the run with the majority of fish taken near the peak time of the spawning run (based on historical run timing records) to avoid selectively altering that character in the population.
- Adult sorting and handling in general is very hard on fish and routinely causes mortality. These can be prevented with a modern sorting and handling system designed to cause the least harm possible to all fish handled (see HGMP section 1.16.3).
- Ovarian fluid and, occasionally, kidney / spleen samples are collected from female spawners to test for the presence of viral pathogens.
- Holding pond procedures follow IHOT guidelines.

8 SECTION 8. MATING

Describe fish mating procedures that will be used, including those applied to meet performance indicators identified previously.

8.1 Selection method.

Mates are selected randomly, starting in the third week of broodstock collection, and spans over five weeks, based on a historical collection curve. Fish are anesthetized with carbon dioxide or electro-narcosis (EN) prior to sorting and sampling.

8.2 Males.

Ripe males are randomly spawned in a 2x1 factorial cross, or a 1x1 factorial cross if there are not enough ripe males for the number of females on a given spawn day.

8.3 Fertilization.

Kalama Falls Hatchery. Eggs are fertilized in a 1x2 or 1x1 factorial cross in April/May; the eggs from a female are divided in half, and fertilized by two different males. All adults are live-spawned: females are generally lived spawned using an air injection method into plastic containers. Males are strip spawned into plastic specimen cups. All eggs are fertilized and eyed at Kalama Falls and shipped after Virology has determined which eggs are IHNV-positive: IHNV-positive eggs are shipped to Fallert Creek Hatchery, and IHNV-negative eggs are shipped to Mossyrock Hatchery. Prior to brood year 2011, green eggs were shipped to Fallert Creek Hatchery for fertilization and eyeing.

8.4 Cryopreserved gametes.

Cryopreserved gametes are not used.

8.5 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish resulting from the mating scheme.

- Protocols for population size, fish health disinfection and genetic guidelines are followed.
- Spawn all collected mature broodstock if possible without regard to age, size, color or other physical characteristics. If not spawning all collected mature adults over the season, apply the same rationale to individual spawn days.
- Randomize mating and avoid selectivity beyond ripeness on a given spawn day.
- Fish are taken near the peak time of spawning (based on historical run timing records) to avoid selectively altering that character in the population.

- Do not mix milt from multiple males and add to eggs (pooling prior to mixing) in order to eliminate disproportionate genetic male contributions.
- Do not re-use males except as part of specific spawning protocols. A given male should be used as the first mate for only one female total.

9 SECTION 9. INCUBATION AND REARING -Specify any management *goals* (e.g. "egg to smolt survival") that the hatchery is currently operating under for the hatchery stock in the appropriate sections below. Provide data on the success of meeting the desired hatchery goals.

9.1 Incubation:

9.1.1 Number of eggs taken and survival rates to eye-up and/or ponding.

Table 9.1.1.1: Survival rates (%) from egg-take to ponding, Kalama endemic winter steelhead.

Brood Year	% Egg Survival	
	Green-to-Eyed (KFH or Fallert)	Eyed Egg-to-Ponding[a] (Fallert Cr or Mossyrock)
2002	91.6	100.0
2003	77.8	100.0
2004	65.5	100.0
2005	86.3	93.4
2006	60.7	100.0
2007	90.1	82.8
2008	90.3	95.3
2009	69.9	97.0
2010	89.6	99.0
2011	99.0	95.3
2012	74.6	99.0
2013	93.0	93.3

Source: WDFW hatchery records.
NA – Not available
[a] As of brood year 2010, IHNV-positive eggs were shipped to Fallert Creek Hatchery. IHNV-negative eggs were shipped to Mossyrock Hatchery.

9.1.2 Cause for, and disposition of surplus egg takes.

Egg-takes are managed according to data/information of historical egg-takes at the facility, and are maintained within the ±5% guideline of the permit. Viral sampling (60 fish lots) is conducted over the course of the season.

In the event that egg survival is higher than expected, excess juveniles will be stocked in local lowland lakes or released to the river at Fallert Creek Hatchery after consultation with NOAA.

9.1.3 Loading densities applied during incubation.

Kalama Falls Hatchery. Fertilized eggs from each female (approximately 3,000 – 4,500 eggs/female) are placed in vertical incubators until eyed.

Fallert Creek Hatchery. Eyed-eggs that Virology determined were IHNV-positive received from Kalama Falls Hatchery are placed in the vertical incubators at 8,000 eggs/unit until hatching.

Mossyrock Hatchery. Eyed-eggs that Virology determined were IHNV-negative received from Kalama Falls Hatchery are incubated in the shallow troughs at 20,000 eggs/unit until hatching.

9.1.4 Incubation conditions.

IHOT species-specific incubation recommendations are followed for water quality, flows, temperature, substrate and incubator capacities. Incubation water temperature is monitored by thermograph and recorded and temperature units (TU) are tracked for embryonic development. Harmful silt and sediment is cleaned from incubation systems regularly while eggs are monitored to determine fertilization and mortality.

Eggs are fertilized and eyed at Kalama Falls Hatchery. As of brood year 2011, eggs eyed at Kalama Falls and are shipped after Virology determined which eggs were IHNV-positive. Eyed-eggs shipped to Fallert Creek Hatchery are IHNV-positive; eyed-eggs shipped to Mossyrock Hatchery are IHNV negative.

Kalama Falls Hatchery. Eggs are placed in vertical incubators supplied with pathogen-free creek water. Eggs are water-hardened in 100 ppm iodophor solution for one hour. Water temperatures range from 37° to 47°F.

Fallert Creek Hatchery. Eyed-eggs are incubated in vertical trays until ponding into the intermediates. Pathogen-free water is provided by Fallert (aka "Hatchery") Creek. Temperatures are monitored daily and range between 40 and 56°F. Dissolved oxygen (DO) is generally at or near saturation at the influent with 7 ppm as the minimum acceptable effluent, although it generally stays within 80% to 90% of saturation. Visual monitoring of sediments in the incubators is conducted daily and are flushed if necessary.

Mossyrock Hatchery. Eyed-eggs are incubated in the shallow troughs until hatched. Temperatures are monitored daily and remain very close to a constant 50°F. DO is generally at or near saturation at the influent with 7 ppm as the minimum acceptable effluent, although it generally stays within 80% to 90% of saturation.

9.1.5 Ponding.

The degree of button-up is usually a 1 to 2 mm slit in the ventral surface. Swim-up and ponding are forced. Temperature units (TU) at ponding average 1,100. Average length is 33.4 mm with an average CV=5.85%.

Fallert Creek Hatchery. Fry are transferred from incubation trays into intermediate troughs until transfer to Kalama Falls in mid-July or remain on-station in raceways.

Mossyrock Hatchery. Fry are transferred to either small or standard raceways prior to reaching the maximum density index in shallow troughs.

9.1.6 Fish health maintenance and monitoring.

Kalama Falls Hatchery. Eggs are incubated on pathogen-free creek water. Fungus is controlled with Parasite-S treatments at 1:600 for 15 minutes, daily, until eggs are eyed. Mortalities are picked after eyeing.

Fry mortality at ponding is generally less than 3%. Monitoring for disease is done on a continuous basis with monthly scheduled visits by the area Fish Health Specialist. Disease treatment varies with the pathogen encountered but generally is antibiotic in nature for bacterial infections and bath or drip treatments with chemotheraputants for external infections.

See also **Attachments 1** and **2** for health monitoring information.

9.1.7 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish during incubation.

- IHOT and WDFW Fish Health guidelines are followed.

- The water source for incubation is regarded as pathogen-free and particulate matter is settled out prior to entering incubation units.
- Staff is available 24/7 to respond to problems.
- Temperature, dissolved oxygen, and flow are monitored.
- Dead eggs are discarded in a manner that prevents disease transmission.

9.2 Rearing:

9.2.1 Provide survival rate data (*average program performance*) by hatchery life stage (fry to fingerling; fingerling to smolt) for the most recent twelve years, or for years dependable data are available.

Problems with IHNV, *Ichthyophthirius*, and Bacterial Coldwater Disease (BCD) have been the major contributors to rearing mortality at the Kalama Hatchery Complex (**Table 9.2.1.1**). In an effort to increase survival rates, all IHNV-negative stock have been reared at Mossyrock Hatchery since brood year 2011, to take advantage of the pathogen-free water.

Table 9.2.1.1: Survival rates (%) from ponding to release, Kalama endemic winter steelhead.

Brood Year	% Rearing Survival
2002	23.0[a]
2003	47.8
2004	42.9
2005	54.4
2006	88.9
2007	52.7[b]
2008	73.5
2009	-----
2010	53.3[c]
2011	49.8[d]
2012	85.9
2013	75.4

Source: WDFW hatchery records.
NA – Not available
[a] Mortalities in BY 2002 due to IHNV.
[b] Mortalities in BY 2007 due to *Ich* and furunculosis; some loss due to otter predation.
[c] Losses in BY 2010 due to poor water quality due to winter storm damage, BCWD and IHNV.
[d] High mortalities in BY 2011 due to BCWD.

Brood year 2009 summer and winter Kalama wild stocks were suffered near 100% due to high temperatures and an epizootic outbreak (*Ichthyophthirius*) at Fallert Creek Hatchery in August 2009. Mortalities reached 95% in three days (see **Attachment 1**). Cowlitz winter-late stock was transferred to Kalama Falls Hatchery in mid-March 2010, to make-up for the shortfall (see **Table 10.3.1**).

9.2.2 Density and loading criteria (goals and actual levels).

After hatching, early swim up occurs at low densities. Fry are allowed to swim-up before initial feed introduction. At approximately 1.5 grams the fry are transferred to intermediate rearing vessels. Loading is kept at 5/lb/gpm (0.44 kg/1pm) inflow.

9.2.3 Fish rearing conditions

Table 9.2.3.1: Monthly average water temperature (°F), Kalama endemic winter steelhead facilities.

Month	Average Water Temperature (ºF)		
	Mossyrock	KFH	Gobar
January	50	42	42
February	50	43	43
March	50	46	46
April	50	48	48
May	50	51	51
June	50	55	n/a
July	50	61	n/a
August	50	60	n/a
September	50	56	n/a
October	50	49	49
November	50	47	47
December	50	43	43

Source: WDFW Hatchery Records 2014.
n/a = Gobar Pond is not used in the summer months.

IHOT standards are followed for: water quality, predator control measures (netting) to provide the necessary security for the cultured stock, loading and density. Environmental parameters: flow rates, water temperatures, dissolved oxygen and Total Settable Solids (TSS) are monitored on a routine basis thru the rearing period.

Mossyrock Hatchery. Fish are reared in the raceways from ponded fry to sub-yearlings (~12 fpp). Dissolved oxygen in the raceways are 7-12 ppm, with average water temperatures at 50°F. Fry are mass-marked (adipose fin-clip) when they are around 100 fpp. A portion of the sub-yearlings may be transferred to Kalama Falls Hatchery in December or January, depending on density and flow indices at Mossyrock Hatchery. The remainder are transported to Gobar Ponds directly in early March at approximately 8 fpp.

Fallert Creek Hatchery. Fry are ponded from the incubation trays into intermediate troughs, once max flow and density indices are reached, fry are either moved to raceways or transferred to Kalama Falls Hatchery. Fish may be reared at Fallert Creek Hatchery until early-March, and then transferred to Gobar Pond.

Kalama Falls Hatchery. Sub-yearlings from Mossyrock and or Fallert may be reared at the Kalama Falls Hatchery, and transported to Gobar Ponds in early-March, at 10 fpp, for final rearing and acclimation.

9.2.4 Indicate biweekly or monthly fish growth information (*average program performance*), including length, weight, and condition factor data collected during rearing, if available.

Table 9.2.4.1: Monthly fish growth information by length (mm), weight (fpp), condition factor and growth rate, Kalama endemic winter steelhead.

Rearing Period	Length (mm)	Weight (fpp)	Condition Factor	Growth Rate
May	NA	1,700	NA	NA
June	32.4	1,371	NA	0.193529
July	50.1	376	NA	0.725748

August	72.6	122	NA	0.675532
September	116.7	55	NA	0.54918
October	103.1	42	NA	0.236364
November	114.6	31	NA	0.261905
December	124.9	23.4	NA	0.245161
January	137.2	18.9	NA	0.192308
February	149.2	15.4	NA	0.185185
March	155.0	12.4	NA	0.194805
April	157.1	10.9	NA	0.120968
May	174.8	9	NA	0.174312

Source: WDFW Hatchery Records.

9.2.5 Indicate monthly fish growth rate and energy reserve data (average program performance), if available.

See HGMP section 9.2.4. No energy reserve data available.

9.2.6 Indicate food type used, daily application schedule, feeding rate range (e.g. % B.W./day and lbs/gpm inflow), and estimates of total food conversion efficiency during rearing (*average program performance*).

Fish are given variety of diet formulations including starter, crumbles and pellets; the food brand used may vary, depending on cost and vendor contracts. Feeding frequencies vary depending on the fish size and water temperature and usually begin at 8 feedings/7 days a week, and end at 1 feeding/5 days a week. Feed rate is applied in accordance with program goals not to exceed 0.1-0.15 pounds feed per gallon in-flow, depending on fish size and varies from 2.0% to 3.0% body weight/day. Average season conversion rates generally are no greater than 1.3:1.0.

9.2.7 Fish health monitoring, disease treatment, and sanitation procedures.

Monitoring. Policy guidance includes: *Fish Health Policy in the Columbia Basin*. Details hatchery practices and operations designed to stop the introduction and/or spread of any diseases within the Columbia Basin. Also, *Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries* (Fish Health Policy Chapter 5, IHOT 1995). A fish health specialist inspects fish monthly and checks both healthy and presence of symptomatic fish. Based on pathological or visual signs by the crew, age of fish and the history of the facility, the pathologist determines the appropriate tests. External signs such as lesions, discolorations, and fungal growths will lead to internal examinations of skin, gills and organs. Kidney and spleen are checked for BKD. Blood is checked for signs of anemia or other pathogens. Additional tests for virus or parasites are done if warranted (see **Attachment 1 -** Fish Health Monitoring history, and **Attachment 2** for Virology Sampling reports).

Disease Treatment. As needed, appropriate therapeutic treatment will be prescribed to control and prevent further outbreaks. At Fallert Creek, fish may be treated with formalin for *Costia* and florfenicol for furunculosis. Sub-yearlings at Kalama Falls Hatchery may be treated with Parasite-S (formalin) for *Ichthyophthirius* and fungus control in adults. Oxytetracycline is used to treat furunculosis. Mortality is collected and disposed of at a landfill. Fish health and/or treatment reports are kept on file (see also **Attachment 1**: Fish Health Monitoring summaries).

Sanitation. All eggs brought to the facility are surface-disinfected with iodophor (as per disease policy). Every effort is made to prevent the horizontal spread of pathogens by splashing water. All equipment (nets, tanks, boots, etc.) is disinfected with iodophor between different fish/egg lots. Different fish/egg lots are physically isolated from each other by separate ponds or incubation units. Footbaths containing disinfectant are strategically located on the hatchery grounds to prevent spread of pathogens. Mortalities are collected and disposed of at a landfill. Fish Health and/or treatment reports are kept on file (see **Attachments 1** and **2** for Fish Health monitoring history).

9.2.8 Smolt development indices (e.g. gill ATPase activity), if applicable.

Gill ATPase activity is not measured. Fish size at release time is critical to the readiness for migration. The migratory state of the release population is determined by fish behavior. Aggressive screen and intake crowding, swarming against sloped pond sides, a leaner (0.80 – 0.90) condition factor (K), a silvery physical appearance and loose scales during feeding events are signs of smolt development.

9.2.9 Indicate the use of "natural" rearing methods as applied in the program.

Not applicable, but smolts from both summer and winter wild progeny are co-mingled in Gobar Pond for final rearing and acclimation. Gobar Pond provides some natural food items, as it is gravel lined acclimation pond in the upper Kalama system.

9.2.10 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish under propagation.

- Steelhead research at Kalama Falls Hatchery has been on-going since 1998, and has resulted in scientific protocols and techniques to handle listed fish populations.
- Facilities provide secure research and operational environment through the use of alarm systems, emergency plans and 24/7 staff.
- Hatchery and research programs operate under approved genetic, spawning, stock transfer, fish health and NPDES discharge requirements.
- Hatchery program smolts are marked to allow differentiation from natural-origin fish.
- Smolts are acclimated and released in areas and timing that mimics wild steelhead in the Kalama system.
- On-going research and adaptive management will provide monitoring needed for the future.

In addition to the measures describing care and handling of the listed fish provided in HGMP sections 2, 8, 9, 11, and 12, actual take will be determined on an annual basis and compared to the levels detailed in the “take” tables at the end of the HGMP. Causes for any take in excess of those provided in the take table will be identified and corrective action will be taken to remedy the problem.

10 SECTION 10. RELEASE

Describe fish release levels, and release practices applied through the hatchery program.

10.1 Proposed fish release levels.

Table 10.1.1: Proposed release levels (maximum number).

Age Class	Maximum Number	Size (fpp)	Release Date	Location
Yearling	45,000	5.5	April/May	Kalama River

Source: WDFW Future Brood Document 2014

Note: 5.5 fpp = 205 mm fork length (fl).
Due to IHNV, fish may be released from Gobar Ponds, Fallert Creek Hatchery, or Kalama Falls Hatchery.

10.2 Specific location(s) of proposed release(s).

Stream, river, or watercourse:	Gobar Creek (WRIA 27.0073); tributary to the Kalama River at RKM 32.2
Release point:	RKm 4.8
Major watershed:	Kalama Sub-Basin
Basin or Region:	Lower Columbia River

10.3 Actual numbers and sizes of fish released by age class through the program.

Table 10.3.1: Number of yearlings released, size, CVs and release date, by age and year.

Release Year	Number	Avg Size (fpp)	CV	Date
2003	15,954	7.9	12.80	May 8
2004	36,644	8.0	12.20	May 1-31
2005	31,916	10.0	7.37	May 1-23
2006	44,803	7.0	n/a	May 1-31
2007	55,866	8.9	14.24	May 1-15
2008	38,820	12.0	16.58	May 1-15
2009	64,990	17.7	11.87	May 1-15
2010	46,949	6.7	6.20	Apr 28[a]
2011	43,585	11.6	14.12	May 9-15
2012	44,025	9.1	12.96	May 1-15
2013	62,031	8.5	17.15	May 1-10
2014	73,651	6.6	13.85	April 29-May 12

Source: WDFW Hatcheries Headquarters Database 2014.
Note: 12.1 fpp = 157 mm fork length (fl); 10 fpp = 167 mm fl; 7.5 fpp = 185 mm; 5.5 fpp = 205 mm
[a] Winter-late steelhead from Cowlitz Trout Hatchery (CTH) were transferred to Kalama Falls Hatchery on March 17, to make up for the wild steelhead that were lost in August 2009 at Fallert Creek Hatchery. The steelhead from CTH were released AD+RV fin-clipped.

10.4 Actual dates of release and description of release protocols.

Yearlings are initially allowed to volitionally out-migrate from the Gobar acclimation pond, starting May 1, and then are force-released. Exit screens are removed and exit stop logs are incrementally pulled throughout May to stimulate outmigration of smolts ready to migrate. Minimum pool depth in the pond (removal of all stop logs) is achieved by the end of May.

(See **Table 10.3.1** for actual release dates.)

10.5 Fish transportation procedures, if applicable.

Fish are transported between facilities using a 0.5% salt (sodium chloride) solution to reduce handling stress. Loading densities are kept between 0.5 and 1.0 pounds per gallon. Temperature is monitored in the tank and tempering is performed at the release site if the difference between the tank and the release water is greater than 7°F. Supplemental oxygen is administered at 2.5 liters per minute.

Fish are transported from Kalama Falls Hatchery or Fallert Hatchery to Gobar Pond via 1,500-gallon tanker; normal transport time is approximately 40 minutes. Fish may be transferred from Mossyrock Hatchery via a 750-gallon; normal transport time is approximately 120 minutes.

10.6 Acclimation procedures (methods applied and length of time).

Final rearing/acclimation occurs at Gobar Pond; fish are volitionally released from in early-May. Pre-smolts are transferred to the acclimation pond in February and provided feed by hand and from demand feeders to reach appropriate goal size at release.

Fish from the wild summer steelhead, wild winter steelhead programs are commingled.

10.7 Marks applied, and proportions of the total hatchery population marked, to identify hatchery adults.

Table 10.7.1: Marks applied, by brood year, age class and mark-type.

Brood Year	Age Class	Number	Mark-Type
2014	**Yearlings**	45,000	AD-only

Fish are released 100% mass-marked (adipose fin-clipped). In previous years (1999-2003), this program additionally used blank-wire tags (cheek or snout, depending on the brood) and cold brands.

Winter-late steelhead from Cowlitz Trout Hatchery (CTH) were transferred to Kalama Falls Hatchery in mid-March 2010 to make up for the catastrophic loss of the Kalama wild steelhead stock at Fallert Creek Hatchery in August 2009. The steelhead from CTH were force-released in May, and identified with an AD+RV fin-clip.

10.8 Disposition plans for fish identified at the time of release as surplus to programmed or approved levels.

The program guidelines for annual broodstock/egg-take collection are managed to prevent any surpluses, and maintained within the ±5% guideline. In the event of surplus >10%, WDFW Regional Managers will in accordance with regional policy and guidelines set forth in management plans/agreements and ESA permits, and after consultation with NMFS, instruct hatchery staff for disposition of the surplus.

10.9 Fish health certification procedures applied pre-release.

All fish are examined for the presence of “reportable pathogens” as defined in the P*acific Northwest Fish Health Protection Committee* (PNFHPC) disease control guidelines, within three weeks prior to release. Fish transfers into the sub-basin are inspected and accompanied by notifications as described in IHOT and PNFHPC guidelines.

Prior to release, the population health and condition is established by the Area Fish Health Specialist. This is commonly done 1-3 weeks pre-release and up to six weeks on systems with pathogen-free water and little or no history of disease. Prior to this examination, whenever abnormal behavior or mortality is observed, staff also contacts the Area Fish Health Specialist. The fish specialist examines affected fish, and recommends the appropriate treatment. Reporting and control of selected fish pathogens are done in accordance with the *Salmonid Disease Control Policy of the Fisheries Co-Managers of Washington State* (WDFW and WWTIT 1998, updated 2006) and IHOT guidelines. See also **Attachment 1 -** Fish Health Monitoring history, and **Attachment 2** for Virology Sampling reports.

10.10 Emergency release procedures in response to flooding or water system failure.

In the event of a water system failure, screens would be pulled to allow fish to exit the ponds or in some cases they can be transferred into other rearing vessels to prevent an emergency release. WDFW also has emergency response procedures for providing back-up pumps, transport trucks, etc. in cases of emergency. In cases of severe flooding the screens are not pulled because flood waters rise to the point where they breach the ponds. Past experience has shown that the fish tend to lie on the bottom of the pond during flooding events and only those that are inadvertently swept out are able to leave. Every effort will be made to avoid pre-programmed releases including transfer to alternate facilities. Emergency releases, if necessary and authorized, would be managed by removal of outlet screens and pull sumps of the rearing units. If possible, staff would set up portable pumps to use river water to flush the fish.

10.11 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish resulting from fish releases.

- All program fish are mass-marked for easy differentiation from naturally-produced fish.
- The production and release of only smolts through fish culture and release practices fosters rapid seaward migration with minimal delay in the rivers, limiting interactions with naturally-produced steelhead juveniles.
- Release strategies are to ensure that hatchery fish migrate from the hatchery/release site with a minimal amount of interaction with native fish populations.
- WDFW fish health and operational concerns for Kalama Falls Hatchery programs are communicated to WDFW Region 5 staff for any risk management or needed treatment. See also HGMP section 9.7.
- WDFW proposes to continue monitoring, research and reporting of hatchery smolt migration performance behavior, and intra and interspecific interactions with wild fish to access, and adjust if necessary, hatchery production and release strategies to minimize effects on wild fish.

11 <u>SECTION 11. MONITORING AND EVALUATION OF PERFORMANCE INDICATORS</u>

11.1 Monitoring and evaluation of "Performance Indicators" presented in Section 1.10.

11.1.1 <u>Describe plans and methods proposed to collect data necessary to respond to each "Performance Indicator" identified for the program.</u>

Performance indicators for harvest will be accomplished by continuing mass-marking (adipose fin-clip). See HGMP section 1.10 Monitoring and Evaluation and HGMP section 12 Research for additional plans and methods to collect necessary data.

On the Kalama River, a life cycle monitoring program provides information on spawner abundance, smolt production, and harvest estimates. This information is needed to address ESA responsibilities (3.1.3), ensure effective harvest (3.2.1), determine trends in natural spawners (3.3.1), evaluate the effect of the hatchery program on natural populations (3.3.2), and provide run time information for future broodstock collection (3.4.1).

Spawner abundance for summer-run steelhead is estimated from fish captured at Kalama Falls hatchery trap, a mark-resight snorkel survey above Kalama Falls, and an assumed jumper rate. Spawner abundance for winter-run steelhead is estimated from fish captured at Kalama Falls hatchery trap and an assumed proportion of spawners between the mouth of the Kalama River and KFH relative to spawners above KFH.

Smolt abundance is currently a combined estimate of summer and winter-run outmigrants. Smolt abundance is currently estimated with a single-trap design and a mark-recapture study. A multi-trap is a potential alternative study design to improve current estimates.

Harvest is estimated using a combination of angler reported catch (Catch Record Card) and creel surveys.

Table 11.1.1.1: Current WDFW Mitchell Act-funded research, monitoring and evaluation projects.

Project	Description
LCR Monitoring	WDFW has implemented an expanded monitoring program for Chinook, coho, chum and steelhead populations in the Lower Columbia River (LCR) region of Southwest Washington (WDFW's Region 5) and fishery monitoring in the lower mainstem of the Columbia River. The focus of this expanded monitoring is to 1) gather data on Viable Salmonid Population (VSP) parameters – spawner abundance, including proportion of hatchery-origin spawners (pHOS), spatial distribution, diversity, and productivity, 2) to increase the coded wire tag (CWT) recovery rate from spawning grounds to meet regional standards, and 3) to evaluate the use of PIT tags to develop harvest rates for salmon and steelhead populations. Additionally, key watersheds are monitored for juvenile salmonid out-migrant abundance. Coupled with adult abundance information, these data sets allow for evaluation of freshwater productivity and development of biological reference points, such as seeding capacity. Monitoring protocols and analysis methods utilized are intended to produce unbiased estimates with measurements of precision in an effort to meet NOAA monitoring guidelines (Crawford and Rumsey 2011).

11.1.2 Indicate whether funding, staffing, and other support logistics are available or committed to allow implementation of the monitoring and evaluation program.

Except for a risk involving genetic introgression, Most aspects of the M&E outlined in HGMP section 1.10 are currently funded (see also HGMP section 11.1.1). Exceptions to this are funding needed to evaluate risks of genetic introgression with segregated programs and funding needed to conduct a multi-trap design and improve smolt estimates.

11.2 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish resulting from monitoring and evaluation activities.

Monitoring, evaluation and research follow scientific protocols with adaptive management process if needed. WDFW will take risk aversion measures to eliminate or reduce ecological effects, injury, or mortality as a result of monitoring activities See HGMP section 1.10 Monitoring and Evaluation for additional plans and methods to collect data necessary, In addition, we will adaptively manage all aspects of the program to continue to minimize associated risks using the more recent available scientific research.

12 SECTION 12. RESEARCH

12.1 Objective or purpose.

For nearly four decades, the Kalama River steelhead research program has provided invaluable information on steelhead biology and steelhead hatchery-wild interactions. Historical work focused on descriptions of steelhead life history and relative reproductive success of segregated (non-native) and integrated (native) hatchery programs. An updated direction to this research program is under development to address the following gaps in understanding of hatchery and wild steelhead:

- Evaluate strategies to successfully meet program goals for smolt production and contributions to fisheries and spawning grounds,
- Evaluate ecological risks of various release strategies and residualism of hatchery steelhead,
- Effects of anesthesia (including electronarcosis) on egg viability and freshwater survival and growth,
- Compare distribution and interactions between hatchery and wild steelhead spawners and between summer and winter-run steelhead spawners,
- Compare repeat spawner rates and kelting rates between hatchery and wild steelhead and between summer and winter-run steelhead,
- Evaluate smolt-to-adult return of summer versus winter-run steelhead,
- Evaluate partial barrier at Kalama Falls hatchery, and
- Evaluate jumper and fall back assumptions used for summer steelhead spawner estimates.

12.2 Cooperating and funding agencies.

WDFW and NMFS (Mitchell Act funding).

12.3 Principle investigator or project supervisor and staff.

Jamie Lamperth (PI-Fish Biologist 3), Joel Quenette (Fish Biologist 1), Mara Zimmerman (Research Scientist 2), Bryce Glaser (Natural Resource Scientist 4).

12.4 Status of stock, particularly the group affected by project, if different than the stock(s) described in Section 2.

Kalama River steelhead populations (summer-run and winter-run) are part of the Lower Columbia River Steelhead ESU, which is listed as threatened under the Federal Endangered Species Act.

12.5 Techniques: include capture methods, drugs, samples collected, tags applied.

Capture methods for adult steelhead include Kalama Falls hatchery adult trap, Modrow weir trap, hook-and-line sampling, and seine nets. Capture methods for juvenile steelhead include rotary screw traps, fence weir, backpack electrofishing, hook-and-line sampling, and seine nets. Snorkeling will be used to enumerate and may be used to orient juvenile or adult steelhead toward the seine nets.

All fish will be anesthetized prior to sampling with either carbon dioxide (adults only), electronarcosis (juvenile or adult), or tricaine methanesulfonate (MS-222, juveniles only).

The following biological information will be collected from fish upon capture: run type, fork length, male/female (adults only), mark status (adipose or other clips, unmarked), coded-wire tag presence (yes, no). Scales will be collected for age determination. Fin tissue or opercle punches will be collected for genetic samples or stable isotope information. Other information which may be collected includes fish weight, muscle fat content (nonlethal microwave fatmeter), and general morphometric measures.

Tags applied may include some combination of the following: Floy, Peterson disk, Passive Integrated Transponder (PIT), Radio, Acoustic, or other tagging techniques useful for tracking fish movements and behavior..

12.6 Dates or time period in which research activity occurs.

The Kalama River steelhead research program is ongoing. Life cycle monitoring activities occur year round for adults and between March and September for outmigrating smolts. Specific research projects as described would be conducted year round as best to address the study question.

12.7 Care and maintenance of live fish or eggs, holding duration, transport methods.

Care and maintenance of steelhead collected for hatchery broodstock is described in HGMP section 7 (adult capture, transport, and holding) and sections 9.1 (incubation).

Care and maintenance of all other steelhead includes anesthesia prior to sampling and recovery prior to releasing sampled fish back to the river. Holding and transportation environments include well oxygenated water held at or near stream temperature.

12.8 Expected type and effects of take and potential for injury or mortality.

Type of take includes – collect for transport (juvenile trap efficiency trials), capture/handle/release (juvenile trap, adult trap, or in-river sampling), capture/handle/tag/mark/tissue sample/release (tagging or sampling as described above for juvenile and adult steelhead), removal (broodstock), intentional lethal take (hormone analysis), unintentional lethal take (mortalities in juvenile or adult trap box or as an unintentional result of sampling methods).

Life cycle monitoring and research activities necessarily subject fish to stress and risk of injury or mortality. Handling protocols have been carefully developed to minimize the potential for injury or mortality and are continually updated when better methods are discovered.

See HGMP section 2.2.3 and "Take" tables at the end of the document.

12.9 Level of take of listed fish: number or range of fish handled, injured, or killed by sex, age, or size, if not already indicated in Section 2 and the attached "take table" (Table 1).

See HGMP section 2.2.3 and "Take" tables at the end of the document.

12.10 Alternative methods to achieve project objectives.

Not applicable.

12.11 List species similar or related to the threatened species; provide number and causes of mortality related to this research project.

Not applicable

12.12 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse ecological effects, injury, or mortality to listed fish as a result of the proposed research activities.

In addition to the measures describing care and handling of the listed fish provided in HGMP sections 2, 8, 9, 11, and 12, actual take will be determined on an annual basis and compared to the levels detailed in the appended take table. Causes for any take in excess of those provided in the take table will be identified and corrective action will be taken to remedy the problem.

13 SECTION 13. ATTACHMENTS AND CITATIONS

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Attachment 1: Fish Health Summaries - Kalama Hatchery Complex, April 1, 2007 through September 30, 2007 to October 1, 2011 through March 31, 2012.

Fallert Creek Hatchery Steelhead

Juveniles: winter steelhead
Fallert Creek 2007 brood year winter steelhead – wild Kalama stock
Fry in the intermediates were experiencing some dropout at the end of June. There was a lot of sandy debris in the head box and general water quality problems. There was a heavy amount of *Ichthyobodo* on the skin and gills, which was treated with formalin. In September, the fish were diagnosed with *Ichthyophthirius*, which was moderate on the skin and gills. This was treated with formalin in 12-hour treatments and salt blocks were added to the raceways. By the end of the month, *Furunculosis* was found and treated with Romet for five days.

The fish were transferred to Gobar Pond in mid-March 2008. They reared well while at Gobar Pond and gained a good amount of growth. These fish shared Gobar Pond with the Kalama wild summer steelhead. All fish in Gobar Pond were volitionally released from mid-April to mid-May 2008.

Fallert Creek: 2008 brood year winter steelhead - wild Kalama River stock
Fish were treated with formalin Romet for *Ichthyophthirius* and *Furunculosis*, respectively, near the end of September. Colder than average water temperatures, flooding events throughout winter, and loss of predator netting during the snow event took its toll on this brood. The bulk of the shortage appears to have happened between mass marking in early-February and shipping to Gobar pond in mid-March 2009, before the netting was completely replaced. They shared the pond with the wild summer-run steelhead and were volitionally released starting May 1, 2009.

Fallert Creek: 2009 brood year winter steelhead (F-1 progeny from wild Kalama River stock)
Green eggs were taken at Kalama Falls Hatchery in April 2009, then transferred to Fallert Creek Hatchery for incubation and rearing. Approximately 99% were lost to an *Ichthyophthirius* outbreak during the period of high water temperatures at the end of July, even after formalin drips. About 50 fish remain and are being reared in an indoor trough.

Fallert Creek: 2010 brood year winter steelhead – wild Kalama stock
Green eggs were taken at Kalama Falls Hatchery and transferred to Fallert Creek Hatchery for incubation. A portion was shipped to Mossyrock Hatchery for rearing through the summer months; the remaining eggs had disease concerns. These fish were healthy with low levels of external parasites when they were either released or transferred to Gobar pond for release in early-May 2011.

Fallert Creek: 2011 brood year winter steelhead – wild Kalama stock
These fish remained healthy except for a fairly severe episode of BCWD in July 2011. The fish responded to treatment with florfenicol. This stock was sent to Kalama Falls in late-August.

Fallert Creek: 2012 brood year winter steelhead – wild Kalama stock
Eyed-eggs transferred from KFH starting in May. Incubated in vertical trays and ponded into intermediate troughs. Fish remained healthy until transfer back to KFH in late-July.

Kalama Falls Hatchery Steelhead

Juveniles: winter steelhead
KFM 2007 brood year winter steelhead – Kalama Hatchery stock

BCWD was found fry in early-April 2007, which was treated with florfenicol. As mortalities increased, fry were tested for IHNV and were found positive. These fish also showed Bacterial Gill Disease (BGD) in mid-May, and hypertrophy of the gill tissue. BCWD was still found in the spleens. By the end of the month loss was almost 85%. The flooding event in November 2006 is suspected of introducing a source of IHNV infection, and it is now contaminated with IHNV.

Furunculosis was detected in August, causing some elevated mortality in the raceways; it was treated with Romet. There was an outbreak of *Ichthyophthirius* in September, which was treated with a low concentration of formalin for 12 hours for several weeks. Salt was also added to the raceways during treatment.

Fish were diagnosed with *Trichodina* in January 2008, and treated with formalin. The Kalama winter steelhead were mixed with Skamania Hatchery winter steelhead and released from the same raceway in mid-April 2008. These fish looked great and the release went well. The high mortality is due to an outbreak of IHNV in the spring 2007.

KFM 2008 brood year winter steelhead – Kalama Hatchery stock
The fish were ponded in April 2008. Within a week, they developed gut fungus (*Visceral mycosis*) coagulated yolk; they were fed Epsom salt at 3%. In May and June, these fish were diagnosed with BGD and were treated with hydrogen peroxide. In July, when the creek source was running dry, the steelhead were moved from the intermediates to a standard raceway with river water. Shortly after the move the steelhead contracted BCWD; which was treated with Aquaflor (florfenicol) feed for ten days. An outbreak of *Trichodina* occurred in August and the fish were treated with Paracide-S (formalin). Losses were incurred because the treatment was administered during periods of low dissolved Oxygen levels and while they were on a very high feeding regime; dissolved Oxygen readings were taken in the morning and the feeding rate was lowered; losses returned to normal levels shortly thereafter.

They were diagnosed with *Ichthyophthirius* in February 2009, and were treated with formalin for three days. A portion was transferred to Roth Pond on the Coweeman River in March; another portion was planted directly into the Coweeman River in late-April.

The remaining fish were healthy, and released onsite in April 2009.

KFM 2008 brood year winter steelhead – Kalama mixed stock
A small number of eggs were taken in early-March. Eyed-eggs were shipped to the Fish First RSI project on Indian Creek.

KFM 2008 brood year winter steelhead – wild Kalama stock
Eggs were taken through April 2008. Eggs were shipped to Fallert Creek Hatchery for incubation and rearing.

KFM: 2009 brood year winter steelhead Kalama hatchery stock
Just after ponding in April 2009, the fry were diagnosed with BCWD and treated with florfenicol medicated feed. The florfenicol treatment was repeated in early July for BCWD. Formalin drips for the control of *Ichthyophthirius* began in mid-August. Fish were sampled to test for the presence of viruses on September 18, and medicated feed for external BCWD was ordered on the same day. IHNV was identified in these samples the following week. Medicated feed and formalin drips began September 23. The mortality rate peaked on September 25.

Formalin drips and oxytetracyline medicated feed were given during the fall and early winter to suppress mortality. Mortality fell from a peak of 3.7%/day on September 25, to 0.1%/day by October 17. On October 22, neurological signs of disease were present in these juveniles. Kidney plus spleen and separate brain samples were obtained from individual fish. Three of the ten kidney plus spleen samples were positive, whereas five of the five brain samples were positive for IHNV. It is possible that the virus persists longer in the brain than in other organs. Later kidney and spleen samples from this population of fish were negative. The loss rate was under 0.01%/day by February 1, 2010, and no IHNV was detected in samples taken in November and December 2009 of what few moribund fish could be found. Survival rate since the start of the outbreak was estimated at 71% in March. Fish were healthy upon release in early-April 2010.

KFM 2010 brood year winter steelhead Kalama hatchery stock
Egg-take occurred from mid-February to mid-March. Green eggs were shipped to Fallert Creek Hatchery for incubation. Fish were ponded in March and April 2010. Winter storm damage caused one of two pathogen-free water sources to be unavailable. In early-June, the pathogen-free water supply ran low, and fish were moved to a raceway, and a 15% shortage was discovered. The shortage may have been a result of poor mortality documentation while on the turbid pathogen-free water source. Shortly after the move the mortality spiked and the steelhead were diagnosed with BCWD, which was treated with Aquaflor (florfenicol) medicated feed for ten days. In early September, the winter steelhead were diagnosed with *Ichthyophthirius* and were then treated with formalin; no significant loss was incurred. These fish were diagnosed with IHNV in early-October 2010; 10% died during the month October. These fish were treated with formalin for 8-hours/day for one week, and the feeding rate was reduced to 0.5% B.W./day. Treatment and reduced diet significantly decreased the mortality rate until late October, when fish were diagnosed with BCWD (0.5-1% mortality per day for approximately 2 weeks). These fish received a 10-day diet of Aquaflor to treat the BCWD. Fungal infections on the skin were also observed and were treated with formalin. A second course of Aquaflor was started in December, due to resurgence in loss from BCWD. These fish grew well in the “hog pens” and had good fat storage. There were reoccurring *Trichodina* infections in February, March and early-April; the fish were treated with formalin for 3-days each time.

These fish were healthy at release in mid-April 2011.

KFM 2010 brood year winter steelhead -wild Kalama River stock
Egg-take occurred through April 2010. Eggs were shipped to Fallert Creek Hatchery for incubation. Fish were received from Mossyrock Hatchery in January 2011. The majority of the wild winter steelhead were shipped from Kalama Falls Hatchery to Gobar Pond in early-March for final rearing. Prior to the release in early-May a small group of wild winters from the Fallert Creek Hatchery was shipped to Gobar Pond. Fish were volitionally released in mid-May 2011.

KFM 2010 brood year winter steelhead Kalama River mixed stock
A small number of eggs were taken in early March, and eyed at Kalama Falls Hatchery. These eggs were shipped to the Fish First RSI project in Indian Creek.

KFM 2011 brood year winter steelhead Kalama hatchery stock
The fish were ponded and supplied with pathogen-free creek water during April and May 2011. These fish developed BCWD and bacterial gill disease, which was treated with Aquaflor (florfenical), a medicated feed and hydrogen peroxide, respectively. The pathogen-free water supply ran low in mid-June 2011, and the fish were moved to a raceway; shortly thereafter, mortality spiked and the steelhead were diagnosed with *Trichodina*, which was treated with formalin. In late-July and August 2011, the fish were diagnosed with *Ichthyophthirius* and were treated with formalin.

These fish experienced an infestation of *Trichodina* in July 2011. Fish responded well to treatment with formalin.

Fish were diagnosed with Bacterial Gill Disease in early-October 2011, which was treated with hydrogen peroxide. Loss initially decreased but increased again in mid-October; the fish were diagnosed with IHNV. Mortality peaked at 0.6%/day and began declining by the end of October but remained elevated through mid-November. BCWD was also isolated at the end of October, but did was not a significant problem. Loss continued at chronic levels and IHNV was still detected in mortalities at the end of December. In mid-February 2012, these fish suffered from and infestation of *Trichodina* which was treated with Paracide-S (formalin). The fish remained healthy through March, but began to experience loss due to *Trichodina* in mid-April, and were treated with formalin. They were scheduled for release on May 1, 2012.

KFM 2011 brood year winter steelhead – F-1 progeny from wild Kalama River stock
Egg-take occurred April-May 2011. All eggs were eyed at Kalama Falls and shipped after virology determined which eggs were IHNV positive: IHNV-positive eyed-eggs were shipped to the Fallert Creek Hatchery. IHNV-negative eyed-eggs were shipped to Mossyrock Hatchery.

The progeny of parents that tested positive for IHNV were shipped back from Fallert Creek Hatchery in late-August. They were healthy during rearing with the exception of low losses in October due to *Trichodina* and *Ichthyophthirius* which was treated with a 1:40,000 formalin drip on three days/week for two weeks.

The progeny of the parents that tested negative for IHNV were reared at Mossyrock Hatchery until late-January 2012, when they were transferred to Kalama Fall Hatchery and combined with the progeny of the IHNV-positive parents. The fish remained healthy until their transfer to Gobar Rearing pond in early-March 2012 for final rearing. Fish were fed aggressively until volitional release in mid-May 2012.

KFM 2012 brood year winter steelhead –wild Kalama River stock
Egg-take occurred April through May 2012. All eggs were eyed at Kalama Falls and shipped after virology determined which eggs were IHNV positive: IHNV-positive eyed-eggs were shipped to the Fallert Creek Hatchery. IHNV-negative eyed-eggs were shipped to Mossyrock Hatchery. *Ichthyophthirius* was detected on the fish in August 2012, but did not reach levels which required treatment until early-September. A formalin drip was initiated for every other day, along with addition of salt to the raceway. Losses were minimal and were healthy and no parasites were detected as of late-September, and the formalin treatment was discontinued. *Trichodina* was detected in the population in January 2013, and was treated with a formalin drip. In March 2013, just prior to their transfer to Gobar Rearing Pond, a number of the fish were observed with dorsal lesions; the fish were again treated with formalin to prevent a secondary fungal infection.

KFM 2012 brood year winter steelhead –Kalama hatchery stock
Light levels of BCWD disease was detected in these fish the end of April 2012, but at levels which didn't warrant treatment and it resolved itself. The fish remained healthy through early July when levels of *Trichodina* reached levels which warranted a formalin treatment. By the end of August, *Ichthyophthirius* became evident in these fish and a low dose, long-term formalin treatment was initiated along with an application of salt. Loss remained low Formalin was discontinued with no parasites were detected as of mid-September. Fish remained healthy until they were diagnosed with *Trichodina* in January 2013, and were treated with formalin. These fish looked very good and were healthy when checked just prior to release. Light *Trichodina* was present, but not causing the fish any distress.

KFM 2013 brood year winter steelhead –Kalama hatchery stock
Losses jumped dramatically in early-April 2013, in the fish ponded into the intermediate tanks. Low levels of gut fungus and BCWD were present, but the primary cause was gas bubble disease; water had just been turned on to another intermediate and the increased water use caused air to be entrained. Losses declined once the water supply was balanced. Fish remained healthy, other than a chronic level of dropout

of small fish, until late August 2013, when the fish were diagnosed with *Furunculosis*. They were treated with 5 day Romet medicated feed. Light *Ichthyophthirius* and *Ichthyobodo* were also detected, but levels were not high enough to warrant treatment. Parasite levels remained low or disappeared during September 2013, and no treatments were given. The fish were doing well through October 2013.

KFM 2013 brood year winter steelhead –wild Kalama stock
All broodstock were negative for IHNV this spawn cycle and the eyed eggs were moved to Mossyrock Hatchery for hatching and early rearing.

Attachment 2: WDFW Virology Sampling 2006-2007 through 2012-2013: Kalama Hatchery Complex steelhead.

Hatchery/ Collection Site	Stock	Species	Date Sampled	Results	Comments	Life Stage	Sample number	Number of fish sampled						ID	Cell Line	*Frozen*	*Inoc Date*
								OF	pools	K/S	pools	fry/visc	pools				
FALLERT	KALAMA R/WILD	WSTHD	09/12/06	NEV	diag; 10^{0}, 10^{-1}	JUV/06	0913-7			5	1						
KALAMA FLS	KALAMA R	SSTHD	02/12/07	**IHNV**	1+/2p OF & K/S	AD	0213-1/2	3	1	3	1			ND	E/C	ND	
KALAMA FLS	KALAMA R/rtn of hat reared wilds	SSTHD	03/05/07	**IHNV**	1+/1p OF & K/S; #4, 5	AD	0306-8/9	2	1	2	1						
KALAMA FLS	KALAMA R/WILD	SSTHD	01/22/07	**IHNV**	1+/2 OF & 1+/1p K/S, #1 & 2	AD	0123-1/2	2	2	2	1			DB	E/C	02/08/07	
KALAMA FLS	KALAMA R/WILD	SSTHD	03/05/07	NEV		AD	0306-6/7	1	1	1	1						
KALAMA FLS	KALAMA R/WILD	SSTHD	03/12/07	**IHNV**	3+/3p OF & K/S, #4-6	AD	0313-8/9	3	3	3	1				E/C		
KALAMA FLS	KALAMA R/WILD	SSTHD	03/26/07	**IHNV**	6+/7p OF & 2+/2p K/S, #7-13	AD	0327-1/2	7	7	7	2				E/C		
KALAMA FLS	KALAMA R/WILD	SSTHD	04/02/07	**IHNV**	7+/7 OF & 2+/2p K/S; #14-20	AD	0403-2/3	7	7	7	2				E/C		
KALAMA FLS	KALAMA R/WILD	SSTHD	04/09/07	NEV	#21; 10^{0}, 10^{-1}, 10^{-2}	AD	0410-8/9	1	1	1	1						
KALAMA FLS	KALAMA R	WSTHD	05/09/07	**IHNV**	4+/4p fry w/ tails cut off; 10^{0}, $10^{-1,}$ 10^{-3}	FRY/06	0510-2					12	4	DB	E/C	05/22/07	
KALAMA FLS	KALAMA R/HAT	WSTHD	12/27/06	**IHNV**	1+/5p K/S	AD	1228-10/11	6	2	18	5			DB	C		
KALAMA FLS	KALAMA R/HAT	WSTHD	01/03/07	**IHNV/REOVIRUS**	IHNV 2+/3p OF & K/S, Reovirus 1+/3p OF	AD	0104-10/11	12	3	12	3			DB/F&P	E/C&C	1/26/07 & 2/9/07	
KALAMA FLS	KALAMA R/HAT	WSTHD	01/09/07	**IHNV**	3+/3p OF & K/S; #19-23, 24-28, 29-32	AD	0110-1/2	14	3	14	3			ND	E/C	ND	
KALAMA FLS	KALAMA R/HAT	WSTHD	01/16/07	**IHNV**	3+/3p OF & K/S, #33-44	AD	0117-8/9	12	3	12	3			ND	E/C	ND	
KALAMA FLS	KALAMA R/HAT	WSTHD	01/22/07	**IHNV**	2+/2p OF & K/S, #45-47 & 48-50	AD	0123-3/4	6	2	6	2			ND	E/C	ND	
KALAMA FLS	KALAMA R/HXW	WSTHD	05/16/07	**IHNV**	12+/12p fry; diag; int ; 10^{0}, 10^{-1}	FRY/07	0517-3					36	12	ND	E/C	ND	
KALAMA FLS	KALAMA R/rtn of hat reared wilds	WSTHD	04/16/07	**IHNV**	1+/1p; 10^{0} - 10^{-2}	AD	0418-1/2	2	1	13	4			ND	E/C	ND	
KALAMA FLS	KALAMA R/rtn of hat reared wilds	WSTHD	04/23/07	**IHNV**	#22-24; 10^{0}, 10^{-1}, 10^{-2}	AD	0424-2/3	3	1	7	2				E/C	ND	
KALAMA FLS	KALAMA R/rtn of hat reared wilds	WSTHD	04/30/07	**IHNV**	10^{0} - 10^{-2}	AD	0501-1/2	10	2	18	4				E/C	ND	
KALAMA FLS	KALAMA R/rtn of hat reared wilds	WSTHD	05/07/07	**IHNV**	3+/3p OF & 5+/5p K/S;10^{0} - 10^{-2}	AD	0508-6/7	15	3	19	5				E/C		
KALAMA FLS	KALAMA R/rtn of hat reared wilds	WSTHD	05/16/07	NEV		AD	0517-1/2	3	1	3	1						
KALAMA FLS	KALAMA R/rtn of hat reared wilds	WSTHD	05/21/07	**IHNV**	1+/1p OF &3+/3 K/S	AD	0522-1/2	3	1	3	3				E/C		
KALAMA FLS	KALAMA R/WILD	WSTHD	04/03/07	NEV	#1 - 4; 10^{0}, 10^{-1}, 10^{-2}	AD	0405-1	4	4								
KALAMA FLS	KALAMA R/WILD	WSTHD	04/10/07	**IHNV**	2+/3p OF; #5-9, 10-14, 15; 10^{0}, 10^{-1}, 10^{-2}	AD	0411-1	11	3					ND	E/C	ND	
KALAMA FLS	KALAMA R/WILD	WSTHD	04/16/07	**IHNV**	#3+/4p OF & 2+/2p K/S; #16-18, 19-21; 10^{0} - 10^{-2}	AD	0418-3	6	2					ND	E/C	ND	
KALAMA FLS	KALAMA R/WILD	WSTHD	04/23/07	**IHNV**	10^{0} - 10^{-2}	AD	0424-1	3	1							ND	
FALLERT CR	KALAMA R	SCOHO	10/17/07	NEV		AD	1018-6/7	60	12	60	12						
KALAMA FLS	KALAMA R	SPCHIN	09/05/07	NEV		AD	0907-1/2	60	12	60	12						
KALAMA FLS	KALAMA R	FCHIN	10/08/07	NEV		AD	1009-9/10	55	11	60	12						
KALAMA FLS	KALAMA R	FCHIN	10/17/07	NEV		AD	1018-5	5	1								
KALAMA FLS	KALAMA R	NCOHO	12/10/07	NEV	no ice pack, samples cool	AD	1211-7/8	60	12	60	12						
KALAMA FLS	KALAMA R	WSTHD	02/11/08	NEV		AD	0212-3			8	2						
KALAMA FLS	KALAMA R	SSTHD	02/12/08	NEV		AD	0213-1/2	1	1	1	1						

Hatchery/ Collection Site	Stock	Species	Date Sampled	Results	Comments	Life Stage	Sample number	Number of fish sampled						ID	Cell Line	*Frozen*	*Inoc Date*
								OF	pools	K/S	pools	fry/visc	pools				
KALAMA FLS	KALAMA R	WSTHD	02/26/08	NEV		AD	0227-3/4	1	1	1	1						
KALAMA FLS	KALAMA R	SSTHD	03/04/08	NEV		AD	0305-5/6	1	1	2	1						
KALAMA FLS	KALAMA R	SSTHD	04/28/08	NEV	OF: #4 & 5	AD	0429-8/9	10	2	17	4						
KALAMA FLS	KALAMA R	WSTHD	05/07/08	NEV	diag; 10^{0}-10^{-3}	FRY/07	0508-1					10	2				
KALAMA FLS	KALAMA R	WSTHD	06/12/08	NEV	diag; 10^{0}-10^{-3}, Intermediate #2	JUV/08	0613-1					15	3				
KALAMA FLS	KALAMA R/HAT	WSTHD	12/26/07	NEV	F1-F3	AD	1227-14/15	3	3	3	3						
KALAMA FLS	KALAMA R/HAT	WSTHD	01/02/08	NEV	F4-8, F9-13, F14-17	AD	0103-21/22	14	3	14	3						
KALAMA FLS	KALAMA R/HAT	WSTHD	01/08/08	NEV		AD	0109-11/12	15	5	15	3						
KALAMA FLS	KALAMA R/HAT	WSTHD	01/15/08	NEV		AD	0116-8/9	20	4	20	4						
KALAMA FLS	KALAMA R/HAT	SSTHD	02/19/08	NEV		AD	0220-3/4	1	1	2	2						
KALAMA FLS	KALAMA R/HAT	WSTHD	04/21/08	NEV	OF 1=#1-4H, 2=#6-10W, 3=W; K/S: 1=W, 2-6=H	AD	0422-1/2	4	1	17	5						
KALAMA FLS	KALAMA R/HXW	SSTHD	03/10/08	NEV	F #1 & M #2	AD	0311-8/9	1	1	2	2						
KALAMA FLS	KALAMA R/HXW	SSTHD	03/25/08	NEV	OF F4-5, K/S F4-5, M4-5	AD	0327-3/4	2	1	4	2						
KALAMA FLS	KALAMA R/WILD	SSTHD	01/29/08	NEV		AD	0130-5/8	1	1	1	1						
KALAMA FLS	KALAMA R/WILD	SSTHD	02/19/08	NEV		AD	0220-1/2	2	1	2	1						
KALAMA FLS	KALAMA R/WILD	SSTHD	03/10/08	NEV		AD	0311-6/7	4	1	4	1						
KALAMA FLS	KALAMA R/WILD	SSTHD	03/25/08	NEV	F10-14	AD	0327-6/7	5	1	5	1						
KALAMA FLS	KALAMA R/WILD	SSTHD	04/01/08	NEV	F15-19, F20-22, M1-5, M6-9	AD	0402-1/2	8	2	17	4						
KALAMA FLS	KALAMA R/WILD	SSTHD	04/07/08	NEV		AD	0408-6/7	1	1	1	1						
KALAMA FLS	KALAMA R/WILD	WSTHD	04/15/08	NEV		AD	0416-2	5	1								
KALAMA FLS	KALAMA R/WILD	WSTHD	04/21/08	NEV			0422-1/2	7	2	5	1						
KALAMA FLS	KALAMA R/WILD	SSTHD	04/28/08	NEV	OF F11-15, 16-20, 21-22	AD	0429-7	12	3								
KALAMA FLS	KALAMA R/WILD	WSTHD	05/05/08	NEV		AD	0506-2/3	9	2	17	4						
KALAMA FLS	WASHOUGAL R	WSTHD	08/01/07	NEV	diag, 10^{0}-10^{-3}	JUV/07	0802-1					6	2				
KALAMA FLS	KALAMA R/HAT	WSTHD	08/13/08	NEV	diag, 10^{0} - 10^{-2}	JUV/08	0814-3					6	2				
KALAMA FLS	KALAMA R	WSTHD	01/06/09	NEV		AD	0107-5/6	17	5	17	4						
KALAMA FLS	KALAMA R	WSTHD	01/13/09	NEV	male K/S pools #1 & 2	AD	0114-16/17	17	4	27	6						
KALAMA FLS	KALAMA R/WILD	SSTHD	02/18/09	NEV	F1	AD	0219-1/2	1	1	1	1						
KALAMA FLS	KALAMA R/WILD	SSTHD	03/03/09	NEV		AD	0304-5/6	2	2	2	1						
KALAMA FLS	KALAMA R/WILD	SSTHD	03/17/09	**IHNV**	1+/1 OF & K/S, #4	AD	0318-4/5	1	1	1	1			DB	EC	03/27/09	
KALAMA FLS	KALAMA R	SSTHD	03/24/09	**IHNV**	1+/1 OF & 1+/2p K/S; K/S male only	AD	0325-3/4	1	1	3	2			ND	E/C	ND	
KALAMA FLS	KALAMA R/WILD	SSTHD	03/24/09	NEV	#5	AD	0325-5/6	1	1	1	1						
KALAMA FLS	KALAMA R/WILD	SSTHD	03/31/09	**IHNV**	1+/2p K/S, F: #2 & M: #2 & 3	AD	0401-7/8	1	1	3	2			ND	E/C	ND	
KALAMA FLS	KALAMA R/WILD	SSTHD	03/31/09	**IHNV**	2+/3p OF & K/S; #6-9, 10-13, 14-16	AD	0401-9/10	11	3	11	3			ND	E/C	ND	
KALAMA FLS	KALAMA R/WILD	SSTHD	04/07/09	**IHNV**	1+/1p OF & 1+/2p K/S, F #1 & M #2	AD	0408-10/11	3	1	2	2			ND	E/C	ND	
KALAMA FLS	KALAMA R/WILD	WSTHD	04/07/09	**IHNV**	2+/4p OF & 1+/3p K/S	AD	0408-8/9	16	4	15	3			ND	E/C	ND	
KALAMA FLS	KALAMA R	WSTHD	04/13/09	**IHNV**	4+/6p OF & 5+/6p K/S; #16-20, 21-25, 26-30, 31-35, 36-40, 41-42	AD	0414-2/3	27	6	27	6			DB	E/C	04/29/09	
KALAMA FLS	KALAMA R/WILD	SSTHD	04/14/09	**IHNV**	1+/1p OF & K/S; F #18-22	AD	0415-2/3	5	1	5	1			ND	E/C	ND	
KALAMA FLS	KALAMA R	WSTHD	04/14/09	**IHNV**	4+/4p OF; F #2-6, 7-11, 12-16, 17	AD	0415-1	16	4					ND	E/C	ND	

Hatchery/ Collection Site	Stock	Species	Date Sampled	Results	Comments	Life Stage	Sample number	Number of fish sampled						ID	Cell Line	*Frozen*	*Inoc Date*
								OF	pools	K/S	pools	fry/visc	pools				
KALAMA FLS	KALAMA R	WSTHD	04/20/09	**IHNV**	3+/4p K/S; #43-47, 48-52, 53-57, 58-62	AD	0421-13			20	4			ND	E/C	ND	
KALAMA FLS	KALAMA R/WILD	WSTHD	04/20/09	**IHNV**	1+/2p OF; #1-5, 6	AD	0421-12	6	2					ND	E/C	ND	
FALLERT CR	KALAMA R	SSTHD	07/31/09	NEV	diag, rcwy 4, EPC 10^0-10^{-3}	JUV/09	0731-1			20	4						
FALLERT CR	KALAMA R	SSTHD	07/31/09	NEV	diag, rcwy 4, EPC 10^0-10^{-3}	JUV/09	0731-1			20	4						
KALAMA FLS	KALAMA R	WSTHD	09/18/09	**IHNV**	2+/2p K/S	JUV/09	0918-6			10	2			PCR	E/C	10/8 & 20/09	
KALAMA FLS	KALAMA R	WSTHD	09/18/09	**IHNV**	2+/2p K/S	JUV/09	0918-6			10	2			PCR	E/C	10/8 & 20/09	
KALAMA FLS	KALAMA R	WSTHD	10/06/09	**IHNV**	2+/2p K/S, moribund, diag, EPC 10^0-10^{-2}	JUV/09	1006-12			10	2				E/C	10/28/09	
KALAMA FLS	KALAMA R	WSTHD	10/06/09	**IHNV**	2+/2p K/S, moribund, diag, EPC 10^0-10^{-2}	JUV/09	1006-12			10	2				E/C	10/28/09	
KALAMA FLS	KALAMA R	WSTHD	10/22/09	**IHNV**	3+/10 K/S & 5+/5 brain, sep brain samples from #6-10	JUV/09	1023-1/2			10	10	5	5			11/16 & 12/21/09	
KALAMA FLS	KALAMA R	WSTHD	10/22/09	**IHNV**	3+/10 K/S & 5+/5 brain, sep brain samples from #6-10	JUV/09	1023-1/2			10	10	5	5			11/16 & 12/21/09	
KALAMA FLS	KALAMA R	WSTHD	11/23/09	NEV	diag, 10^0 - 10^{-2}	JUV/09	1123-4			4	1						
KALAMA FLS	KALAMA R	WSTHD	11/23/09	NEV	diag, 10^0 - 10^{-2}	JUV/09	1123-4			4	1						
KALAMA FLS	KALAMA R	WSTHD	12/09/09	NEV	diag, 10^0 - 10^{-2}	JUV/09	1210-10			5	1						
KALAMA FLS	KALAMA R	WSTHD	12/09/09	NEV	diag, 10^0 - 10^{-2}	JUV/09	1210-10			5	1						
KALAMA FLS	KALAMA R	WSTHD	12/28/09	NEV	OF & K/S: #F1-5, F6	AD	1229-11/12	6	2	6	2						
KALAMA FLS	KALAMA R	WSTHD	12/28/09	NEV	OF & K/S: #F1-5, F6	AD	1229-11/12	6	2	6	2						
KALAMA FLS	KALAMA R	WSTHD	01/05/10	NEV	F #7-11, 12-16, 17-18	AD	0106-11/12	12	3	12	3						
KALAMA FLS	KALAMA R	WSTHD	01/12/10	NEV	#19-23, 24-28, 29-32	AD	0114-10/11	14	3	14	3						
KALAMA FLS	KALAMA R	WSTHD	01/20/10	NEV	#33-38, 39-43, 44-45	AD	0121-7/8	12	3	12	3						
KALAMA FLS	KALAMA R	WSTHD	01/26/10	NEV	moribund, 10^0 - 10^{-2}	JUV/09	0126-6			4	1						
KALAMA FLS	KALAMA R	WSTHD	01/26/10	NEV	#45-48, 49-52, 53-56, 57-60	AD	0127-5/6	16	4	16	4						
FALLERT CR/KALAMA FLS	KALAMA R/WILD	SSTHD	02/17/10	NEV		AD	0217-4/5	1	1	1	1						
KALAMA FLS	KALAMA R	WSTHD	02/17/10	NEV	mort, diag, EPC 10^0 - 10^{-2}	JUV/08	0217-3			1	1						
KALAMA FLS	KALAMA R/WILD	SSTHD	02/17/10	NEV		AD	0217-6/7	1	1	1	1						
FALLERT CR/KALAMA FLS	KALAMA R/WILD	SSTHD	03/02/10	NEV	F #3-6	AD	0302-5/6	4	1	4	1						
KALAMA FLS	KALAMA R/WILD	SSTHD	03/02/10	NEV	F #2	AD	0302-5/6	1	1	1	1						
FALLERT CR/KALAMA FLS	KALAMA R/WILD	SSTHD	03/09/10	NEV	OF and K/S: F #6-10	AD	0310-8/9	5	1	5	1						
KALAMA FLS	KALAMA R/WILD	SSTHD	03/09/10	**IHNV**	1+/1p OF; F #3-6, M1-4	AD	0310-6/7	4	1	8	2			PCR	E	03/24/10	
FALLERT CR/KALAMA FLS	KALAMA R/WILD	SSTHD	03/16/10	NEV	F #11-20	AD	0317-1/2	10	10	10	10						
KALAMA FLS	KALAMA R	WSTHD	03/25/10	NEV	moribund R7	JUV/09	0326-1			1	1						
FALLERT CR/KALAMA FLS	KALAMA R/WILD	WSTHD	04/13/10	**IHNV**	1+/10, F #1-10	AD	0414-1	10	10						E		
KALAMA FLS	KALAMA R/H F1 WILD	WSTHD	04/13/10	**IHNV**	6+/6p OF & K/S	AD	0414-2/3	30	6	30	6				E/C	04/30/10	
KALAMA FLS	KALAMA R/H F1 WILD	WSTHD	04/20/10	**IHNV**	6+/12p OF, #11-22	AD	0421-4	12	12							05/05/10	
KALAMA FLS	KALAMA R/H F1 WILD	WSTHD	04/20/10	**IHNV**	6+/6p, #131-159	AD	0421-5/6	29	6	29	6				E/C		
KALAMA FLS	KALAMA R	WSTHD	10/06/10	**IHNV**	3+/4p, diag, A=moribund, B-D=morts, 10^0-10^{-3}	JUV/10	1006-15			10	4			PCR	E/C	10/29/10	
KALAMA FLS	KALAMA R/WILD	SSTHD	01/20/11	**IHNV**	1+/1p K/S, F #1	AD	0121-1/2	1	1	1	1			DB	E/C	02/10/11	

Hatchery/ Collection Site	Stock	Species	Date Sampled	Results	Comments	Life Stage	Sample number	Number of fish sampled						ID	Cell Line	*Frozen*	*Inoc Date*
								OF	pools	K/S	pools	fry/visc	pools				
KALAMA FLS	KALAMA R/WILD	SSTHD	01/31/11	**IHNV**	3+/3p K/S, diag, all morts, EPC 10^{0} - 10^{-3}	JUV/10	0131-5			15	3			SN	E/C	02/10/2011 and 3/22/11	
KALAMA FLS	KALAMA R/WILD	SSTHD	03/02/11	**IHNV**	1+/1p OF & K/S, #3	AD	0303-12/13	1	1	1	1				E/C	04/07/11	
KALAMA FLS	KALAMA R/WILD	SSTHD	03/07/11	**IHNV**	12+/12p K/S; 10^{0}, 10^{-1}	JUV/10	0307-2			60	12				E/C	03/22/11	
KALAMA FLS	KALAMA R/WILD	SSTHD	03/21/11	**IHNV**	1+/2p K/S; F #8-11	AD	0322-9/10	4	4	6	2				E/C		
KALAMA FLS	KALAMA R	WSTHD	01/03/11	NEV	F #7-11	AD	0105-1/2	5	1	5	1						
KALAMA FLS	KALAMA R/WILD	SSTHD	03/30/11	**IHNV**	2+/11p OF & 1+/4 K/S; F#12-15, 16-19, 20-22, M #4-5	AD	0331-3/4	11	11	20	5				E/C		
KALAMA FLS	KALAMA R	WSTHD	01/12/11	**IHNV**	2+/2p OF & 3/4p K/S; F #12-16, #17-18 & M #	AD	0112-15/16	7	2	16	4						
KALAMA FLS	KALAMA R	WSTHD	01/20/11	**IHNV**	3+/3p OF & 5+/5p K/S; F #19-23, 24-28, 29-30 & M #1-5, 6-10	AD	0121-3/4	12	3	22	5						
KALAMA FLS	KALAMA R	WSTHD	01/25/11	**IHNV**	2+/2p OF & 1/2p K/S	AD	0126-8/9	6	2	6	2				E/C		
KALAMA FLS	KALAMA R/H F1 WILD	WSTHD	04/20/11	**IHNV**	3+/3p OF & K/S, F #1-5, 6-10, 11-12	AD	0421-3/4	12	3	12	3				E/C		
KALAMA FLS	KALAMA R/H F1 WILD	WSTHD	04/26/11	**IHNV**	2+/2p OF & 4+/4p K/S; F #13-17, 18-20 & M #1-5, 6-9	AD	0428-2/3	8	2	17	4				E/C		
KALAMA FLS	KALAMA R/H F1 WILD	WSTHD	05/03/11	**IHNV**	1+/10p OF & /4p K/S; F #1-5, 6-7 & M #1-5, 6-10	AD	0504-11/12	7	2	17	4				E/C		
KALAMA FLS	KALAMA R/H F1 WILD	WSTHD	05/10/11	**IHNV**	K/S: #1=F, #2=F+M, #3=M	AD	0511-2/3	7	2	13	3				E/C		
KALAMA FLS	KALAMA R/WILD	WSTHD	04/20/11	**IHNV**	3+/10p OF	AD	0421-2	10	10					PCR	E/C	05/03/11	
KALAMA FLS	KALAMA R/WILD	WSTHD	04/26/11	**IHNV**	1+/2p OF, #11-12	AD	0428-1	2	2						E/C		
KALAMA FLS	KALAMA R/WILD	SSTHD	02/15/11	NEV	K/S: F2	AD	0216-2/3	1	1	1	1						
KALAMA FLS	KALAMA R/WILD	WSTHD	05/03/11	**IHNV**	1+/5p OF, F #13-17	AD	0504-10	5	5						E/C		
KALAMA FLS	KALAMA R/WILD	WSTHD	05/10/11	**IHNV**	#18-24	AD	0511-1	7	7						E/C		
KALAMA FLS	KALAMA R/WILD	SSTHD	03/15/11	NEV	#4-7	AD	0316-3/4	4	1	4	1						
KALAMA FLS	KALAMA R/WILD	SSTHD	04/05/11	NEV	OF: F#23; K/S: F#23, M#23	AD	0406-2/3	1	1	2	2						
KALAMA FLS	KALAMA R	WSTHD	12/28/10	**IHNV**	1+/2p K/S; F #1-3, 4-6	AD	1229-14/15	6	2	6	2			DB	E/C	01/11/11	
KALAMA FLS	KALAMA R/H	WSTHD	10/03/11	NEV	Diag 10^{0}-1^{-3} , #1=dead, #2=fungus, #3=moribund	JUV/11	1003-6			9	3						
KALAMA FLS	KALAMA R/H	WSTHD	10/11/11	**IHNV**	Diag 10^{0}-10^{-3}, 1+/1p	JUV/11	1012-7			3	1			DB		10/27/11	
KALAMA FLS	KALAMA R/H	WSTHD	10/31/11	**IHNV**	2 w/ 2 fish 1 w/ 3 fish (1-M, 2-D, 3-D); 3+/3P	JUV/11	1101-2			7	3			DB		11/15/11	
KALAMA FLS	KALAMA R/H	WSTHD	12/06/11	NEV	diag	JUV/11	1207-4			4	2						
KALAMA FLS	KALAMA R/H	WSTHD	12/28/11	**IHNV**	diag, 10^{0}-10^{-3}; K/S separate from brain, both K/S and brain 1+/1P	JUV/11	1229-1/2			3	1	3	1		E/C	3/8/12	
KALAMA FLS	KALAMA R/H	WSTHD	01/04/12	**IHNV**	K/S: 4+/6P	AD	0105-20/21	30	6	30	6			SN	E/C	1/25/12	
KALAMA FLS	KALAMA R/H	WSTHD	01/19/12	**IHNV**	OF: 5+/5P; K/S: 4+/6P	AD	0120-1/2	24	5	30	6						
KALAMA FLS	KALAMA R/W	SSTHD	02/13/12	**IHNV**	OF: 1+/2P	AD	0214-1/2	2	2	2	2			DB	E/C	3/15/12	
FALLERT	KALAMA R	SSTHD	02/13/12	NEV		JUV/11	0214-3			6	2						
KALAMA FLS	KALAMA R/H F1 WILD	SSTHD	02/21/12	NEV	K/S: F#1	AD	0223-3/4	1	1	1	1						
KALAMA FLS	KALAMA R/W	SSTHD	02/28/12	NEV	OF & K/S: F#3	AD	0229-4/5	1	1	1	1						
KALAMA FLS	KALAMA R/W	SSTHD	03/05/12	**IHNV**	F#4; OF: 1+/1P	AD	0306-1/2	1	1	1	1					3/23/12	
KALAMA FLS	KALAMA R/W	SSTHD	03/12/12	**IHNV**	OF & K/S: F#5 1+/1P	AD	0313-5/6	1	1	1	1				E/C		
KALAMA FLS	KALAMA R/W	SSTHD	03/20/12	**IHNV**	OF & K/S: F#6-8, both 2+/3P	AD	0321-14/15	3	3	3	3				E/C		
KALAMA FLS	KALAMA R/H F1 WILD	SSTHD	03/20/12	**IHNV**	OF & K/S: F#2 hatchery, OF No CPE, K/S 1+/1P	AD	0321-16/17	1	1	1	1			DB	E/C	4/17/12	
KALAMA FLS	KALAMA R/W	SSTHD	03/26/12	**IHNV**	F9, F10, F11, F12: OF 4+/4P; K/S 3+/4P	AD	0327-5/6	4	4	4	4				E/C		

Hatchery/ Collection Site	Stock	Species	Date Sampled	Results	Comments	Life Stage	Sample number	Number of fish sampled						ID	Cell Line	*Frozen*	*Inoc Date*
								OF	pools	K/S	pools	fry/visc	pools				
KALAMA FLS	KALAMA R/H F1 WILD	SSTHD	03/26/12	**IHNV**	F3 HATHCHERY: both OF K/S 1+/1P	AD	0327-7/8	1	1	1	1				E/C		
KALAMA FLS	KALAMA R/W	SSTHD	04/03/12	**IHNV**	F13-F22; OF: 9+/10P; K/S: 6+/10P	AD	0404-5/6	10	10	10	10						
KALAMA FLS	KALAMA R/W	SSTHD	04/09/12	NEV	F23	AD	0410-1/2	1	1	1	1						
KALAMA FLS	KALAMA R/W	LWSTHD	04/17/12	**IHNV**	F#1 to 6, 2+/6P	AD	0419-3	6	6					DB	E/C	5/2/12	
KALAMA FLS	KALAMA R/H	WSTHD	04/18/12	NEV	Pond 18, moribund, Diag 10E0-10E-3	JUV/12	0419-4			5	1						
KALAMA FLS	KALAMA R/W	LWSTHD	04/24/12	**IHNV**	F#7-12, 3+/6P	AD	0425-1	6	6						E/C		
KALAMA FLS	KALAMA R/H F1 WILD	LWSTHD	05/01/12	**IHNV**	OF: 4+/4P; K/S: 5+/5P	AD	0502-1/2	17	4	21	5				E/C		
KALAMA FLS	KALAMA R/W	LWSTHD	05/01/12	**IHNV**	#13-23; 4+/11P	AD	0502-3	11	11						E/C		
KALAMA FLS	KALAMA R/H F1 WILD	LWSTHD	05/10/12	**IHNV**	OF: 2+/2P; K/S: 6+/6P	AD	0511-1/2	7	2	22	6				E/C		
KALAMA FLS	KALAMA R/H	WSTHD	10/03/11	NEV	Diag 10^0-1^{-3} , #1=dead, #2=fungus, #3=moribund	JUV/11	1003-6			9	3						
KALAMA FLS	KALAMA R/H	WSTHD	09/11/12	NEV	diag, 10^0-10^{-3}	JUV/12	0912-3			1	1						
KALAMA FLS	KALAMA R/WILD	SSTHD	10/10/12	NEV	DIAG, 10E0-10E-3	JUV/12	1011-4			5	1						
KALAMA FLS	KALAMA R/H	WSTHD	10/10/12	NEV	DIAG, 10E0-10E-3	JUV/12	1011-5			6	2						
KALAMA FLS	KALAMA R/H	WSTHD	01/09/13	NEV		AD	0110-1/2	9	2	9	2						
KALAMA FLS	KALAMA R/H	WSTHD	01/16/13	NEV		AD	0117-7/8	8	2	24	6						
KALAMA FLS	KALAMA R/H	WSTHD	01/24/13	NEV		AD	0125-2/3	6	2	10	2						
KALAMA FLS	KALAMA R/WILD	SSTHD	02/14/13	NEV	OF: WSF1-4	AD	0215-5/6	4	4	4	1						
KALAMA FLS	KALAMA R/WILD	SSTHD	02/28/13	NEV	Hisu#1	AD	0301-3/4	1	1	1	1						
KALAMA FLS	KALAMA R/H F1 WILD	SSTHD	03/21/13	NEV	HSR-2	AD	0322-3/4	2	1	4	1						
KALAMA FLS	KALAMA R/WILD	SSTHD	03/21/13	NEV	OF: WSR 5 and 6, K/S:WSR 5	AD	0322-5/6	2	2	2	1						
KALAMA FLS	KALAMA R/WILD	SSTHD	04/02/13	NEV	WSR-7 THRU WSR-26	AD	0403-10/11	20	20	21	5						
KALAMA FLS	KALAMA R/H	WSTHD	04/08/13	NEV	#1 morib, #2 dead Diag 100 TO 10-3	FRY13	0408-1					9	2				
KALAMA FLS	KALAMA R/WILD & F1 WILD	WSTHD	04/11/13	NEV	#1-9 wild * F1 hatchery	AD	0411-2/3	14	10	10	2						
KALAMA FLS	KALAMA R/H F1 WILD	WSTHD	04/17/13	NEV		AD	0417-11/12	4	2	5	1						
KALAMA FLS	KALAMA R/WILD	WSTHD	04/17/13	NEV	#10-14	AD	0417-10	5	5								
KALAMA FLS	KALAMA R/H F1 WILD	WSTHD	04/25/13	NEV		AD	0425-1/2	16	6	30	7						
KALAMA FLS	KALAMA R/WILD	WSTHD	04/25/13	NEV	OF: #15-26	AD	0425-3/4	12	12	2	2						
KALAMA FLS	KALAMA R/H F1 WILD	WSTHD	05/06/13	NEV	#1 no #, #28	AD	0506-1	10	2								
KALAMA FLS	KALAMA R/H F1 WILD	WSTHD	05/06/13	NEV		AD	0506-2			13	3						
KALAMA FLS	KALAMA R/H	WSTHD	12/27/13	NEV		AD	1228-1/2	13	3	26	9						

Source: WDFW Fish Health Lab data 2014 (John Kerwin)

Note: For Kalama system Chinook data, see Kalama spring and fall Chinook HGMPs.

14 SECTION 14. CERTIFICATION LANGUAGE AND SIGNATURE OF RESPONSIBLE PARTY

"I hereby certify that the information provided is complete, true and correct to the best of my knowledge and belief. I understand that the information provided in this HGMP is submitted for the purpose of receiving limits from take prohibitions specified under the Endangered Species Act of 1973 (16 U.S.C.1531-1543) and regulations promulgated thereafter for the proposed hatchery program, and that any false statement may subject me to the criminal penalties of 18 U.S.C. 1001, or penalties provided under the Endangered Species Act of 1973."

Name, Title, and Signature of Applicant:

Certified by______________________________ Date:_____________

15 ADDENDUM A. PROGRAM EFFECTS ON OTHER (AQUATIC OR TERRESTRIAL) ESA-LISTED POPULATIONS. (Anadromous salmonid effects are addressed in Section 2).

15.1 List all ESA permits or authorizations for USFWS ESA-listed, proposed, and candidate salmonid and non-salmonid species associated with the hatchery program.

The WDFW and the USFWS have a Cooperative Agreement pursuant to section 6(c) of the Endangered Species Act that covers the majority of the WDFW actions, including hatchery operations.

> *"The department is authorized by the USFWS for certain activities that may result in the take of bull trout, including salmon/steelhead hatchery broodstocking, hatchery monitoring and evaluation activities and conservation activities such as adult traps, juvenile monitoring, spawning ground surveys..."*

15.2 Describe USFWS ESA-listed, proposed, and candidate salmonid and non-salmonid species and habitat that may be affected by hatchery program.

Several USFWS listed and candidate species are found in Cowlitz County, however the hatchery operations and facilities for this program do not fall within the critical habitat for any of these species. As such there are no effects anticipated for these species.

Listed or candidate species:
“No effect” for the following species:

Bull trout (*Salvelinus confluentus*) – Threatened (Critical Habitat Designated)
Nelson's checker-mallow (*Sidalcea nelsoniana*) –Threatened
Marbled murrelet (*Brachyramphus marmoratus*) –Threatened (Critical Habitat Designated)
Columbian White-Tailed deer (*Odocoileus virginianus leucurus*) – Endangered
Gray Wolf (*Canis lupus*) –Threatened
Northern Spotted owl (*Strix occidentalis caurina*) –Threatened (Critical Habitat Designated)

Candidate Species
North American wolverine *(Gulo gulo luteus)* – contiguous U.S. DPS

15.3 Analyze effects.

Not applicable.

15.4 Actions taken to minimize potential effects.

Program coho are released fully smolted to foster rapid outmigration from the basin and to minimize predation and residualism risks.

15.5 References

Not applicable.

16 “Take” Tables

Table 1. Estimated listed salmonid take levels of by hatchery activity.

Listed species affected: Lower Columbia Steelhead (*Oncorhynchus mykiss*)	**ESU/Population:** Lower Columbia River Steelhead	**Activity:** Kalama Winter-Late Steelhead Program
Location of hatchery activity: Kalama Falls Hatchery, Kalama River (WRIA 27.0002)at RKm 16.1.	**Dates of activity:** January - June	**Hatchery program operator:** WDFW

Type of Take	**Annual Take of Listed Fish By Life Stage (*Number of Fish*)**			
	Egg/Fry	**Juvenile/Smolt**	**Adult**	**Carcass**
Observe or harass [a]				
Collect for transport [b]				
Capture, handle, and release [c]		TBD	TBD	
Capture, handle, tag/mark/tissue sample, and released[d]				
Removal (e.g. broodstock) [e]				
Intentional lethal take [f]				
Unintentional lethal take [g]		TBD	TBD	
Other Take (specify) [h]				

Take Tables to be submitted to NOAA-NMFS, in progress.

a. Contact with listed fish through stream surveys, carcass and mark recovery projects, or migrational delay at weirs.
b. Take associated with weir or trapping operations where listed fish are captured and transported for release.
c. Take associated with weir or trapping operations where listed fish are captured, handled and released upstream or downstream.
d. Take occurring due to tagging and/or bio-sampling of fish collected through trapping operations prior to upstream or downstream release, or through carcass recovery programs.
e. Listed fish removed from the wild and collected for use as broodstock.
f. Intentional mortality of listed fish, usually as a result of spawning as broodstock.
g. Unintentional mortality of listed fish, including loss of fish during transport or holding prior to spawning or prior to release into the wild, or, for integrated programs, mortalities during incubation and rearing.
h. Other takes not identified above as a category.

Instructions:

1. An entry for a fish to be taken should be in the take category that describes the greatest impact.
2. Each take to be entered in the table should be in one take category only (there should not be more than one entry for the same sampling event).
3. If an individual fish is to be taken more than once on separate occasions, each take must be entered in the take table.

Table 2. Estimated listed salmonid take levels of by hatchery activity.

Listed species affected: Chinook (*Oncorhynchus tshawytscha*)	**ESU/Population:** Lower Columbia River Chinook	**Activity:** Kalama Winter-Late Steelhead Program
Location of hatchery activity: Kalama Falls Hatchery, Kalama River (WRIA 27.0002) at RKm 16.1. Fallert Creek Hatchery, Fallert Creek (WRIA 27.0017) at RKm 8.2; tributary to the Kalama River at RKm. 4.9. Mossyrock Hatchery, Cowlitz River (WRIA 26.0002) at RKm 96.6 Gobar Pond, Gobar Creek (WRIA 27.0073) at RKm 4.8.; ; tributary to the Kalama River at RKm. 32.2.	**Dates of activity:** January-June May-June	**Hatchery program operator:** WDFW

Type of Take	Annual Take of Listed Fish By Life Stage (***Number of Fish***)			
	Egg/Fry	**Juvenile/Smolt**	**Adult**	**Carcass**
Observe or harass [a]				
Collect for transport [b]				
Capture, handle, and release [c]			TBD	
Capture, handle, tag/mark/tissue sample, and released[d]				
Removal (e.g. broodstock) [e]				
Intentional lethal take [f]				
Unintentional lethal take [g]		TBD	TBD	
Other Take (specify) [h]				

a. Contact with listed fish through stream surveys, carcass and mark recovery projects, or migrational delay at weirs.
b. Take associated with weir or trapping operations where listed fish are captured and transported for release.
c. Take associated with weir or trapping operations where listed fish are captured, handled and released upstream or downstream.
d. Take occurring due to tagging and/or bio-sampling of fish collected through trapping operations prior to upstream or downstream release, or through carcass recovery programs.
e. Listed fish removed from the wild and collected for use as broodstock.
f. Intentional mortality of listed fish, usually as a result of spawning as broodstock.
g. Unintentional mortality of listed fish, including loss of fish during transport or holding prior to spawning or prior to release into the wild, or, for integrated programs, mortalities during incubation and rearing.
h. Other takes not identified above as a category.

Table 3. Estimated listed salmonid take levels of by hatchery activity.

Listed species affected: Steelhead (*Oncorhynchus mykiss*)	**ESU/Population:** Lower Columbia River Steelhead	**Activity:** Kalama Winter-Late Steelhead Program
Location of hatchery activity: Kalama Falls Hatchery, Kalama River (WRIA 27.0002) at RKm 16.1. Fallert Creek Hatchery, Fallert Creek (WRIA 27.0017) at RKm 8.2; tributary to the Kalama River at RKm. 4.9. Mossyrock Hatchery, Cowlitz River (WRIA 26.0002) at RKm 96.6 Gobar Pond, Gobar Creek (WRIA 27.0073) at RKm 4.8.; ; tributary to the Kalama River at RKm. 32.2.	**Dates of activity:** January-June May-June	**Hatchery program operator:** WDFW

Type of Take	**Annual Take of Listed Fish By Life Stage (*Number of Fish*)**			
	Egg/Fry	**Juvenile/Smolt**	**Adult**	**Carcass**
Observe or harass [a]				
Collect for transport [b]				
Capture, handle, and release [c]			TBD	
Capture, handle, tag/mark/tissue sample, and released[d]				
Removal (e.g. broodstock) [e]				
Intentional lethal take [f]				
Unintentional lethal take [g]		TBD	TBD	
Other Take (specify) [h]				

a. Contact with listed fish through stream surveys, carcass and mark recovery projects, or migrational delay at weirs.
b. Take associated with weir or trapping operations where listed fish are captured and transported for release.
c. Take associated with weir or trapping operations where listed fish are captured, handled and released upstream or downstream.
d. Take occurring due to tagging and/or bio-sampling of fish collected through trapping operations prior to upstream or downstream release, or through carcass recovery programs.
e. Listed fish removed from the wild and collected for use as broodstock.
f. Intentional mortality of listed fish, usually as a result of spawning as broodstock.
g. Unintentional mortality of listed fish, including loss of fish during transport or holding prior to spawning or prior to release into the wild, or, for integrated programs, mortalities during incubation and rearing.
h. Other takes not identified above as a category.

Table 4. Estimated listed salmonid take levels of by hatchery activity.

Listed species affected: Coho (*Oncorhynchus kisutch*)	**ESU/Population:** Lower Columbia River Coho	**Activity:** Kalama Winter-Late Steelhead Program
Location of hatchery activity: Kalama Falls Hatchery, Kalama River (WRIA 27.0002) at RKm 16.1. Fallert Creek Hatchery, Fallert Creek (WRIA 27.0017) at RKm 8.2; tributary to the Kalama River at RKm. 4.9. Mossyrock Hatchery, Cowlitz River (WRIA 26.0002) at RKm 96.6 Gobar Pond, Gobar Creek (WRIA 27.0073) at RKm 4.8.; ; tributary to the Kalama River at RKm. 32.2.	**Dates of activity:** January-June May-June	**Hatchery program operator:** WDFW

Type of Take	**Annual Take of Listed Fish By Life Stage (*Number of Fish*)**			
	Egg/Fry	**Juvenile/Smolt**	**Adult**	**Carcass**
Observe or harass [a]				
Collect for transport [b]				
Capture, handle, and release [c]			TBD	
Capture, handle, tag/mark/tissue sample, and released[d]				
Removal (e.g. broodstock) [e]				
Intentional lethal take [f]				
Unintentional lethal take [g]		TBD	TBD	
Other Take (specify) [h]				

a. Contact with listed fish through stream surveys, carcass and mark recovery projects, or migrational delay at weirs.
b. Take associated with weir or trapping operations where listed fish are captured and transported for release.
c. Take associated with weir or trapping operations where listed fish are captured, handled and released upstream or downstream.
d. Take occurring due to tagging and/or bio-sampling of fish collected through trapping operations prior to upstream or downstream release, or through carcass recovery programs.
e. Listed fish removed from the wild and collected for use as broodstock.
f. Intentional mortality of listed fish, usually as a result of spawning as broodstock.
g. Unintentional mortality of listed fish, including loss of fish during transport or holding prior to spawning or prior to release into the wild, or, for integrated programs, mortalities during incubation and rearing.
h. Other takes not identified above as a category.